

# SMALL SYSTEM VENDOR COMPETITIVE ANALYSIS

INPUT



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## OFFICES

### Headquarters

1943 Landings Drive  
Mountain View, CA 94043  
(415) 960-3990  
Telex 171407

### Detroit

220 E. Huron  
Suite 209  
Ann Arbor, MI 48104  
(313) 971-0667

### New York

Park 80 Plaza West-1  
Saddle Brook, NJ 07662  
(201) 368-9471  
Telex 134630

### United Kingdom

INPUT, Ltd.  
Airwork House  
35 Piccadilly  
London, W1V 9PB  
England  
01-439-8985  
Telex 23116

AUTHOR

Small-System Vendor Competitive

TITLE

Analysis

BORROWER'S NAME

F-SS2  
1983

Data Service Company, Ltd.

Building

Kita Aoyama

Minato-ku

7

090

87

consult

on & Co AB

4

Stockholm

0

41

any

ON GmbH

Ethenbrunnen 1

D-6380 Bad Homburg

West Germany

Telex 418094

Italy

Milan 284-2850

Telex 310352

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SMALL-SYSTEM VENDOR  
COMPETITIVE ANALYSIS

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## SMALL-SYSTEM VENDOR COMPETITIVE ANALYSIS

### ABSTRACT

This report analyzes the competitive structure of field service operations of major small-system vendors. Service components such as dispatching, parts distribution, pricing, and service business analysis are included. In addition, the report contains vendor case studies for Data General, Hewlett-Packard, Prime, IBM, and DEC. Case studies have been included in order to demonstrate how a variety of service techniques have been introduced and administered successfully by small-system vendors.

This competitive analysis report is based on interviews with 20 major small-system vendors. The information resulting from these interviews was statistically analyzed in order to ensure confidentiality while at the same time identifying field service industry trends.

The report contains 112 pages, including 28 exhibits.

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## I INTRODUCTION



## I INTRODUCTION

- This report is produced by INPUT as part of the 1983 Field Service Program for the United States, for clients of that program.
- The progressive field service organization, having evolved from hardware maintenance to systems support, from cost center to profit center, is looking more and more for new ways to reduce costs while exploring new sources of revenue generation. In this report, INPUT provides a competitive analysis of the field service operations of the major small-scale systems vendors. The report will recommend service offerings and improvements that will improve user satisfaction and provide additional sources of revenue.

### A. SCOPE

- In this report, INPUT analyzes components of the service organization, such as dispatching, parts distribution, pricing, and invoicing; in each component, successful applications and possible improvements are indicated. In addition, potential new revenue sources, such as extended services and new service offerings, are explored.
- Finally, case studies of small-system vendors showing current applications of recommended service techniques are presented, in order to show how these techniques have resulted in successful administration of the maintenance service.

## B. METHODOLOGY

- This report is based on data gathered from small-scale vendors in interviews using the questionnaire shown in the Appendix. The information was statistically analyzed in order to present trends in the industry while assuring that company confidentiality was maintained.
- Much of the following information resulted from extensive secondary research of all available public information, including annual reports, 10-K reports, press releases, and other media information.
- Additional information was derived from ongoing vendor analysis conducted by INPUT in multiclient and custom research.



## II EXECUTIVE SUMMARY



## II EXECUTIVE SUMMARY

### A. TOTAL SERVICE CONCEPT

- Today's small-system user looks to the field service organization to provide systems support. Systems support is currently defined as the maintenance of systems software and systems hardware. In some cases, systems support includes support of the vendor's application software products, but this is usually accomplished by marketing.
- Other postsales support functions accomplished by marketing include user training, and documentation and systems consulting. The energies of the marketing staff, however, should be concentrated on market definition, competitive analysis, sales argument development, and application analysis - in a word, on market planning. The same can be said of some of the postsales functions that are carried out by the sales organization but which do not widen the market served: add-on sales, supplies sales, and upgrades.
- In contrast, the goal of the field service organization is the retention, satisfaction, and development of the installed user base. It is gradually becoming evident that responsibility for all postsales support activities needs to be concentrated in the hands of that part of a company's organization that is best suited to handle it: field service. This does not necessarily mean making a salesperson out of the field service engineer, but it does mean placing account management responsibility in the engineer's hands.

- The benefits from such a move include improved client relations/communications, improved account control and management, and an all-around increase in productivity from company employees (e.g., reduced duplication of visits to customers and more sales time to concentrate on new account development). Substantial improvement in the quality of feedback on user needs should also result, and this should in turn eliminate unnecessarily optimistic sales forecasts and should highlight actual user needs.
- Naturally such a shift in responsibility is unlikely to happen overnight and will be met by internal resistance. However, a phased transfer of responsibility for activities such as ongoing user training consulting and user support documentation should begin now.

## B. REVENUE GROWTH FROM USER REQUIREMENTS

- One disturbing trend that is becoming apparent is that like all of the previous IBM price umbrellas, the field service umbrella is about to come down. At present it is not clear how fast or where this will happen, but it is clear that IBM intends to become very aggressive on all product fronts - and that this probably includes service pricing.
- If this were to happen, new field service revenue sources would become necessary in order to sustain the top-line (revenue) and bottom-line (profit) contributions that top management has become accustomed to. The addition of software maintenance (and the potential growth of revenues from this source) is a first line of new revenue, but others must be found.
- In addition to the immediate transfer of some of the postsales support activities currently provided by marketing, user requirements can provide a strong guideline as to what additional/optional services can be targeted. These



services may include, for some sections of the user base, a contractual half-hour response, a guaranteed response time, guaranteed systems availability, or other services.

- A new user base segmentation is needed that cuts across the standard groupings now used (e.g., customer size, industry sector) and concentrates on the type/quality of service needed. The result of the segmentation would be an expansion of the number of standard option contracts available to the user base, an increase in overall user satisfaction - and an increase in revenue.
- User resistance to hardware maintenance price increases is already manifest (and if the service price umbrella comes down, user resistance will increase), but there is no such resistance to software maintenance price increases as yet. This is due to the fact that software maintenance is currently only a small line item on the user's budget. INPUT believes that software maintenance prices on average could be doubled with little user reaction. This would provide the revenue needed to fund a much-needed improvement in software support and would supply the revenues to support the next generation of on-line software maintenance services.

### C. SOLE-SOURCE MAINTENANCE: A MARKET WITHOUT IBM

- Sole-source maintenance is one very attractive option open to most equipment vendors. It has the benefits of increased account control and increased service revenue. Sole-source maintenance also offers some nice options in the future and is a special variety of third-party maintenance - special in that it applies to a vendor's own customer base, rather than to someone else's.
- The sole-source maintenance approach aims at eliminating all other vendors' maintenance contracts from a given vendor's customer sites. It can be achieved by offering the user a single maintenance contract that covers all of

the products connected to a vendor's systems, whether the products are the vendor's own or someone else's. The maintenance of foreign devices can either be accomplished directly by the system vendor itself, or it can be brokered to the equipment's manufacturer.

- The advantages of offering single-source maintenance are:
  - Competitive service contracts with the user are eliminated.
  - The user cannot make comparisons between foreign service and the vendor's own service.
  - There is an increase in revenue (brokerage fees are typically a 10% markup of the actual cost of the foreign service).
  - The potential of accomplishing the service itself (when the installed base density of such products is sufficient to support a service operation).
  - The user need not know when the changover from foreign to direct service occurs; in any case the contract does not change, only the service source.
- One other attraction of the sole-service maintenance market is that it is a market free from IBM (which will not offer service to another vendor's products). A number of vendors (including DEC, NCR, and Honeywell) are planning moves in this direction.

#### D. PROFIT CONTRIBUTION OF FIELD SERVICE IS SECURE

- Despite the gloomy outlook for field service prices, the continued growth of field service revenue from other sources seems enough to offset the expected downturn in standard contract fees. The recession appears to be over and large-system shipments are improving. Productivity tools already in place (such as remote diagnostic tools) are capable of being applied to software maintenance as well as to hardware maintenance. Computer-automated spares control and dispatching suggest further gains in cost control. Field engineer productivity is rising.
- The result is that the profit contribution expected from field service will increase steadily, providing healthy returns on the recent investments made in support centers, centralized dispatch facilities, and repair centers.
- Some corrective steps are immediately necessary:
  - Large-scale system vendors must improve their software maintenance services, which are currently not adequate; the way to do this is to increase software maintenance charges and to channel the revenue obtained into providing deeper end-user support, in particular remote tie-ins for diagnostics and downline loading of corrected code.
  - Support must be focused on two areas:
    - Presale support: this is the responsibility of marketing, using field service where appropriate (e.g., environmental planning, software/hardware configurations), but on a fee-paying basis (intracompany billing where necessary). This includes use of field service personnel for sales calls and goodwill visits.

- Postsales support: this is the responsibility of field services, using the sales force where appropriate (e.g., add-on sales, new models, additional systems). Customer satisfaction should be the sole responsibility of the field service organization.

## E. PROFITABILITY TARGETS

- The total service concept mentioned above is instrumental in increasing field service revenues by offering new services to replace revenues that were lost due to declining hardware maintenance prices. Vendors that treat field service as a business have found service to be a major revenue source.
- Most vendors were reluctant to discuss the profitability targets of field service. Those that did respond said they expected profits in the 4-8% range.
- Field service revenues represented between 11 and 31% of total revenue for the responding vendors. Clearly this is a very significant portion of the average business. In addition, field service revenue is not as vulnerable to market fluctuations as is revenue for the rest of the industry.
- The importance of including field service development costs into the product's sales price cannot be overemphasized. If development costs (e.g., documentation design and logistics planning) are not included in the original sales price, they must be recovered through maintenance revenues. Maintenance revenues then become inflated and third-party groups have an opportunity to pick up business.



## F. FIELD SERVICE IN MARKETING AND PRODUCT DEVELOPMENT

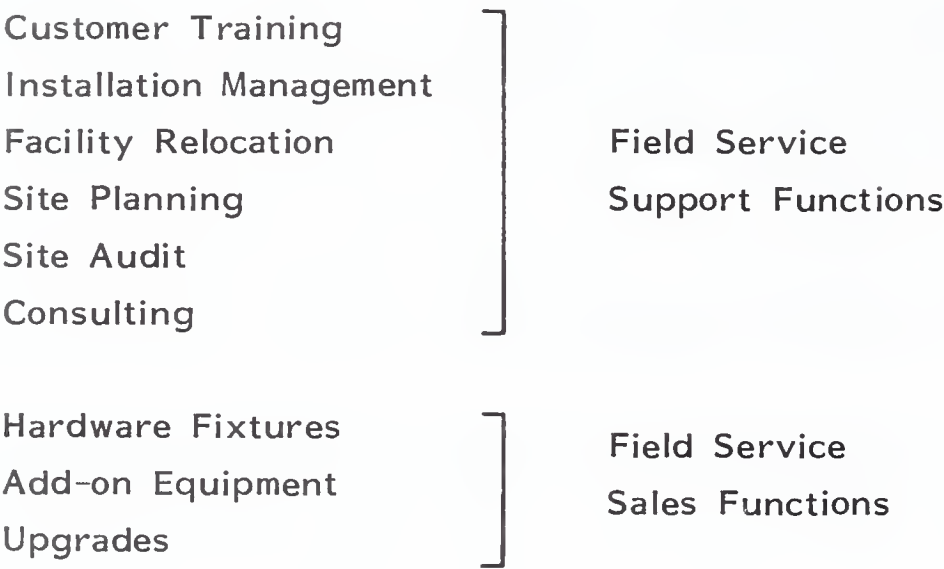
- As the industry moves away from the traditional methods of on-site maintenance and moves toward the concept of total service, field service departments must be prepared to accept greater responsibility for a variety of after-sales support services. Exhibit II-1 lists some of these services.
- Field service will expand to market upgrades and selected services. Whether field service retains its identity or is merged into another department (such as marketing) is a decision many small-system manufacturers will make in the next few years. Advantages of a merger include:
  - Complete support services offered through one department.
  - Greater efficiency in administration.
  - Expanded after-sales support services offered by field services.

## G. OPPORTUNITIES IN FIELD SERVICE

- Competition in field service is likely to intensify as the result of two factors: the necessary reduction in on-site maintenance and the trend toward single-source maintenance. Independent corporations are already aggressively pursuing small-system maintenance markets and, if unchecked, could make serious inroads in vendor field service revenues.
- Many users express the opinion that in many areas they are receiving a higher level of service than they require. By altering the priorities of their services, vendors can shift available resources to concentrate on maintenance areas that have the greatest potential to improve user satisfaction.

EXHIBIT II-1

SMALL-SYSTEMS  
AFTER-SALES SUPPORT SERVICES



- The documentation being shipped to users definitely needs improvement. Forty-five percent of the small-system users interviewed by INPUT indicated they were dissatisfied with the documentation they received. The opportunity here is to increase product sales by supplying effective documentation. Field service will be instrumental in generating effective documentation because of their knowledge of the users' capabilities and needs.
- Training and consulting are other areas that are in need of improvement. Over 30% of surveyed small-system users were dissatisfied with training services. User satisfaction can be improved dramatically by customizing training to meet the individual user's needs. Field service is the natural source of this training because of its knowledge of the user's situation.
- Finally, users can benefit if field service becomes involved in such sales support functions as the sale of supplies, upgrades, etc. Users typically oppose field service in a direct-sales role, but field service's support of sales is welcomed.

## H. AREAS OF CONCERN FOR VENDORS

- The following are the questions that will require upper-level managers' attention now or in the near future:
  - Should there be a slowdown in the movement toward user involvement in hardware maintenance?
  - How do we handle areas outside our support locations and still be competitive with the large-size vendors that already have support in these locations?

- How can we price maintenance so that it does not jeopardize future profits?
- Should we offer product performance guarantees in the area of repair time and software fix turnaround time?
- Should we expand field service's role in the marketing of services and supplies?
- Can dealerships perform the necessary support functions to the satisfaction of personal computer users?
- Should the vendors in the office product sector of the systems business expand the use of third-party maintenance organizations?
- How will we deal with foreign add-ons and attachments when problems occur on our systems?
- Should we provide maintenance for local-area networks and for the products attached?



### III SMALL-SYSTEM FIELD SERVICE ORGANIZATION



### III SMALL-SYSTEM FIELD SERVICE ORGANIZATION

#### A. STAFF PRODUCTIVITY

- Field service operations in most small-system organizations are now being treated as profit/loss centers rather than as cost centers. INPUT estimates that less than 10% of small-system vendors retain cost center status for their field service departments.
- Labor costs are the major expenses in field engineering departments. Consequently, the desire to improve productivity and thereby reduce personnel expense is a major goal of small-system vendors. Exhibit III-I ranks the most commonly used methods of measuring improvements in field service productivity.
- The ratio of gross revenue to field engineers and the ratio of total expenses to total revenue are, by far, the most commonly used measurement methods. Vendors report that these methods will continue to grow in importance as trends in diagnostics and in component-level exchange-rather-than-repair reduce on-site repair time and decrease personnel expenses.
- This reduction in on-site repair time also explains the declining use of the personnel-to-equipment ratio as a measurement method. Remote diagnostics in particular distorts the ratio in that the FE is no longer solely responsible for diagnosing and repairing equipment.

EXHIBIT III-1

MEASUREMENT OF CHANGES IN  
FIELD SERVICE PRODUCTIVITY - SMALL-SCALE SYSTEMS

| MEASUREMENT METHOD                                      | PERCENT<br>CITING USE |
|---|-----------------------|
| Ratio of Gross Revenue to Field<br>Service Personnel    | 75%                   |
| Net Ratio of Expenses to Revenue<br>(After Improvement) | 73                    |
| Ratio of Personnel to Equipment<br>(By Category)        | 58                    |
| Ratio of Management to Field<br>Service Personnel       | 9                     |

- While most vendors regard the ratio of management to field service staff as important to the organizational functioning of their departments, very few (9%) use it as a measure of productivity. This ratio will grow in importance as the technical expertise of first-line managers is needed to back up less skilled FEs.
- Exhibit III-2 lists the major components used in measuring field service productivity in 1982 and 1983. The most dramatic gain, 31%, is in the average number of calls made weekly by FEs. This increase is the result of the two factors mentioned above: remote diagnostics and component exchange. These expanded field service capabilities promote higher productivity of the FE but also result in increased parts inventories and support staff. INPUT projects that as these trends continue, the number of calls per week per engineer will continue to experience extensive growth.
- INPUT expects field service productivity (as measured by revenue per field engineer) to increase steadily in the next three to five years. This increase will result mainly from considerable growth in the field service support functions. These functions include centralized dispatch, remote diagnostics/repair, increased spare parts inventory, and software/hardware hotline support.
- As the number and efficiency of field service support functions continues to grow, many small-system vendors will measure productivity on the basis of revenue per field service staff member. Exhibit III-2 demonstrates that although revenue in this category is considerably less than revenue per field engineer, it is a more realistic measure of the field service department's profitability.
- Exhibit III-3 lists activities that have contributed significantly to productivity improvement.

EXHIBIT III-2

PRODUCTIVITY FACTORS 1982-1983  
SMALL-SCALE SYSTEMS

| FACTOR                                    | 1982     | 1983     | PERCENT<br>CHANGE |
|---|----------|----------|-------------------|
| Revenue per Field Engineer                | \$81,648 | \$90,876 | +11               |
| Revenue per Field Service<br>Staff Member | 62,100   | 68,200   | +10               |
| Calls per Week per Engineer               | 13       | 17       | +31               |



# EXHIBIT III-3

## AREAS OF PRODUCTIVITY IMPROVEMENT SMALL-SCALE SYSTEMS

| AREA OF IMPROVEMENT            | PERCENT CITING IMPROVEMENT | PERCENT PRODUCTIVITY IMPROVEMENT |
|--------------------------------|----------------------------|----------------------------------|
| Cross-Training                 | 64%                        | 19%                              |
| Remote Diagnostics             | 64                         | 17                               |
| Centralized Dispatch           | 55                         | 29                               |
| Regional Parts Depots          | 55                         | 11                               |
| Support Centers                | 50                         | 13                               |
| Field Education                | 45                         | 20                               |
| Repair Center                  | 36                         | 22                               |
| Multiple Territory Assignments | 10                         | 0                                |

- Highest on this list is the cross-training of field service personnel and the use of remote diagnostics, with each technique cited by 64% of the respondents and having an average productivity improvement of 19 and 17%, respectively.
- The next grouping, with each activity cited by about one-half of the respondents, includes: centralized dispatch, regional parts depots, and support centers.
- At 29%, the use of centralized dispatch showed the highest productivity improvement overall. The use of regional parts depots and support centers was among the lowest in productivity gain, at 11 and 13% respectively.
- Field education and repair centers were cited by 45 and 36% of the respondents, contributing 20 and 22% productivity improvement for each.
- Multiple-territory assignments as a technique for improving productivity were cited by 10% of the respondents but were not credited with any improvement.
- Vendors noted time and again that newly instituted services such as centralized dispatch and regional repair centers were most likely to experience productivity improvements. Companies with established support programs in areas such as parts depots and support centers almost uniformly reported lower productivity improvements. This is caused in part by the effects of economies of scale and learning curves, and in part by the inability of vendors to continually increase the motivation of field service support employees.
- There are differing opinions about the benefits of having field service perform depot repair. As products become more modularized and test equipment more expensive, it is generally agreed that manufacturing should be responsible for parts repair. The concern of many field service people is that the availability of spares will be restricted if regional depots are staffed by manufacturing departments. This is a logistical problem that management must address if maintenance prices and service are to remain competitive.

## B. SERVICE DELIVERY MODES

- Exhibit III-4 lists the different types of delivery modes offered by small-system vendors. Remote diagnostics are and will continue to be the most commonly used maintenance delivery mode (besides actual on-site service).
- Remote diagnostics are currently offered by 70% of small-system vendors, and this figure will increase in the next three to five years. This service is becoming important to vendors for two reasons: the increase in cost of field service personnel and the dispersion of customer installations. Vendors anticipate reduced field service expenses and higher profits as a result of remote diagnostics applications.
- Honeywell, for example, has used remote diagnostics since 1977 and is now able to trouble-shoot down to the component level via its remote support facility (RSF). Honeywell supports both hardware and software remote diagnostics on its DPS6 minicomputer.
- DEC has recently consolidated its European remote diagnostics facilities - called Telediagnosis - in Switzerland. Perkin Elmer was late in initiating remote diagnostics, but announced in 1982 that it was installing this feature in all its 32-bit machines.
- As mentioned earlier, remote diagnostics are being promoted by vendors because they allow vendors to reduce the most expensive portion of the service budget - labor. While vendors are committed to remote diagnostics, small-system users are not as enthusiastic. In a recent INPUT survey, only 27% of small-system users said they had a requirement for remote diagnostics. The reluctance on the part of users could pose a problem to vendors that plan on expanding the remote diagnostic capabilities of their machines.

# EXHIBIT III-4

## SERVICE DELIVERY MODES OFFERED BY SMALL-SYSTEM VENDORS

| SERVICE                            | PERCENT OFFERED BY |      |
|------------------------------------|--------------------|------|
|                                    | 1983               | 1985 |
| Remote Diagnostics                 | 70%                | 75%  |
| Depot Maintenance (Carry /Mail-in) | 60                 | 70   |
| On-site Standby                    | 55                 | 55   |
| Depot Maintenance (Pick-up)        | 45                 | 55   |
| Third-party Maintenance            | 40                 | 65   |
| LAN Maintenance                    | 35                 | 65   |

- Exhibit III-5 lists small-system user ratings of alternative methods of service. Clearly, the most favored method by users is the traditional method of on-site support. Users are reluctant to be involved in the diagnostics process and are opposed to delivery of failed modules to repair centers.
- Many of the vendors interviewed by INPUT have recognized the unwillingness of users to be involved in these service areas and are introducing new services to overcome user reluctance. DEC, for example, has recently produced a "self-maintenance handbook," which is designed to provide users with step-by-step instructions for initiating simple maintenance procedures. Other vendors are allocating FE time to training and consulting with the customer.
- Vendors have recognized that remote diagnostics will reduce contact between the FE and the customer and this may result in an increasing level of customer dissatisfaction. Vendors plan to offset this by offering a variety of ancillary services such as the training mentioned above. Other services are discussed below in Exhibit III-10.
- A second major service delivery mode is depot maintenance. Most vendors currently have depot/repair centers located throughout the country and, as shown in Exhibit III-4, this trend is increasing. Companies such as DEC offer carry-in maintenance at over 100 servicers throughout the U.S. Others, like Perkin Elmer and Hewlett-Packard, maintain just a few major repair depots. Hewlett-Packard is expanding its services to include maintenance at the local level through approved dealers.
- Third-party maintenance will grow dramatically in the next few years as vendors attempt to increase field service revenues by providing single-source service. Users have reported that they strongly favor (8.04 on a 10-point scale) single-source maintenance, and many small-system vendors have been quick to respond.

# EXHIBIT III-5

## SMALL-SYSTEM USER RATINGS OF ALTERNATIVE SERVICE CATEGORIES

| CATEGORY                                   | RATING   |          |
|--|----------|----------|
|  | HARDWARE | SOFTWARE |
| User Involvement in Diagnostics            | 6.3      | 6.6      |
| User Delivery of Modules to Repair Centers | 4.0      | 3.9      |
| Telephone Support                          | 5.5      | 5.6      |
| On-Site Support                            | 8.4      | 8.1      |

Scale: 1 = Low, 10 = High



- Digital Equipment Corporation (DEC) announced in October 1983 that it would act as a service agent for selected manufacturers' equipment that is sold into a DEC system. Honeywell has agreed to service Racal-Redac customers, and NCR will be the national service agent for CTS printers and printing terminals.
- The fastest growing service delivery mode listed in Exhibit III-4 is local-area network maintenance. Sixty-five percent of small-system vendors plan to offer LAN maintenance by 1985, up from 35% in 1983. This growth corresponds to the dramatic increase in third-party software maintenance discussed below. LAN growth is traceable in large part to the tremendous growth in small business office systems. HP, for example, is designing "PC Central" to network the newly introduced HP 150 to the company's model 3000 or 9000 computers.
- Centralized dispatch and telephone (hotline) support are seen by many vendors as instrumental in improving field service profitability and user satisfaction. Almost all vendors reported that they operate some type of telephone hotline service. Honeywell, for example, maintains a technical assistance center (TAC) for customers and FEs. TAC personnel can run remote diagnostics or refer to an on-line library of documentation, system symptoms, and solutions.
- Four Phase introduced a centralized automated dispatch in the late 1970s and it has been so successful that the company is now selling it as a stand-alone software package.
- IBM, a leader in dispatching technology, is working with Motorola to develop a nationwide radio communications system for field service personnel. Each FE will tie into a large IBM system via a handheld, portable terminal.
- Approximately 68% of the vendors interviewed by INPUT now utilize some form of centralized dispatch. Another 14% are planning to establish centralized dispatch centers by 1985. Only 4% of the vendors interviewed had no plans for centralized dispatching.

- Exhibit III-6 lists a comparison of the three major dispatching alternatives: branch, district, and central. The exhibit demonstrates the lack of local control on a truly centralized system. For this reason, midsize organizations (300-800 FEs) typically rely on regional dispatching. Very large organizations report best results when dispatching is closer to the district level.

### C. SPARE PARTS DISTRIBUTION

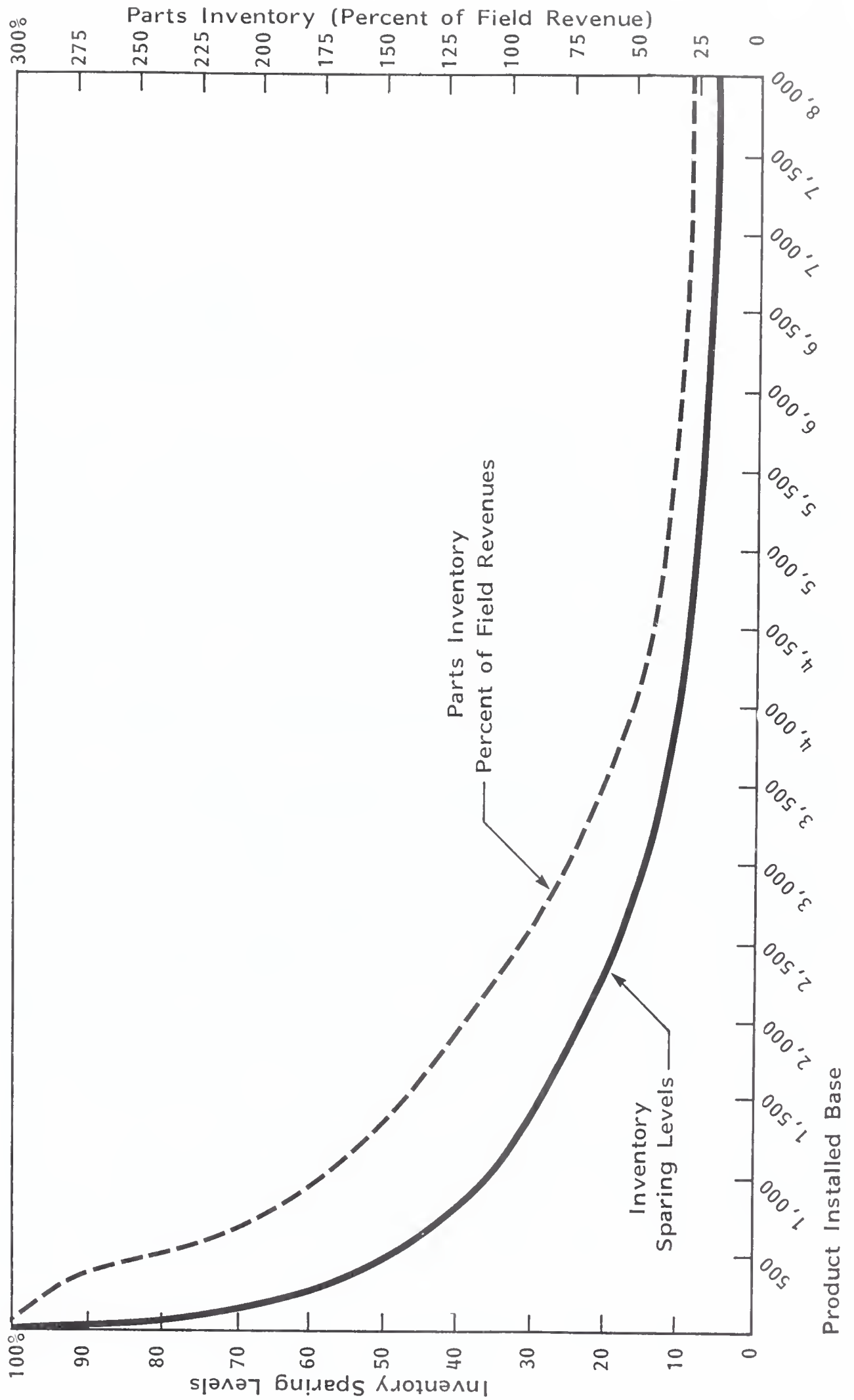
- Demand for spare and replacement parts on small computer systems will increase in the next three to five years for the following reasons:
  - Increase in product base.
  - Increase in the total number of small systems sold and serviced.
  - Greater user involvement in maintenance.
  - Trend toward replacing failed parts rather than repairing on-site.
- Maintenance of parts inventories and distribution of spare parts has become a multi-million-dollar issue to most small-system vendors. Honeywell, for example, has two major centralized parts depots, 75 regional depots, and 1,000 stock points in the U.S. (And this does not even include spare parts maintained at user sites).
- Spares investment for those vendors surveyed equals between 20 and 30% of the gross service revenue for 1983. Obviously, most manufacturers strive to achieve the lowest sparing levels possible and still maintain a satisfied customer base. For currently installed products, that sparing level should be 4% to 7%.

EXHIBIT III-6  
SMALL-SCALE SYSTEMS  
COMPARISON OF DISPATCH METHODS

| OPERATIONAL<br>CRITERIA  | DISPATCH ALTERNATIVES   |  |  |
|--|---|--|--|
|  | BRANCH  | DISTRICT   | CENTRAL  |
| Field Management Control of FE                                 | High  | Moderate   | Low  |
| HQ Management Control of Daily Operations                      | Little  | Moderate   | Considerable   |
| Call Escalation (Alert) Procedures                             | System alerts in sequence: Area/branch office, district office, regional office, headquarters | System alerts dispatcher who contacts area/branch office and subsequently district manager. Regional office and headquarters are alerted by FEs. | System only alerts dispatcher, dispatcher alerts in sequence area/branch office, district office, regional office, headquarters. |
| Ability of District Management to Affect Customer Satisfaction | Good  | Very Good  | Poor   |
| Ability to Calm Irrate Customer                                | Very Good   | Good   | Poor   |
| Awareness of Local Conditions Affecting FE Dispatching         | Good  | Fair   | Poor   |
| Knowledge of Customer  | Good  | Good to Fair   | Fair to Poor   |
| Response of Dispatcher to FE Question                          | Fast: Branch Phones are Continually Staffed   | Fast: District Phones are Adequately Staffed   | Fast: Large Number of Dispatchers  |
| Hardware & Communications Cost                                 | High  | Low to Moderate  | Low  |
| Off-hour Dispatch  | Poor  | Poor to Good   | Same as Regular Shift  |
| Protection from Loss of Dispatch Center                        | Adjacent Area Assumes Lost Center's Activity  | Redundant Hardware   | Redundant Hardware   |
| Manual Backup  | Easy  | Moderate   | Very Difficult   |

- Exhibit III-7 shows the apparent sparing curve of field service vendors. The main management tool for reducing spares costs is the careful tracking of product volumes and order-only replacement spares at specific install bases. (In our example, approximately 3,200 units).
- Component exchange-not-repair is one of the major reasons for increased parts inventory. Four Phase is planning for an 85-95% exchange of failed boards (rather than repairing them in the field). Up to 25% of the failed boards are tested as good at repair centers, but while they are in the pipeline they increase the demand for parts.
- The fact that more users are performing maintenance on their machines also increases spare parts inventories. Vendors such as Perkin Elmer have established sophisticated programs (Express Parts Bank) in order to offer same-day parts service to users. Users typically maintain spare parts inventories of their own and that too increases the overall demand for parts.
- Eighty percent of the small-system vendors interviewed by INPUT indicated that they offer on-site spare parts to their users. CODEX, for example, maintains a repair and return plan so that users can keep backup parts on-site. DEC is another vendor that encourages module exchange (either mail-in or carry-in) by the user.
- While spare parts are effective in improving machine reliability and user attitudes toward the vendor, increasing inventories can be a substantial drain in capital. Seventy-five percent of the small-system vendors interviewed felt that parts inventories would continue to increase through 1985. Increasing demand for parts will require vendors to be more efficient in inventory tracking and distribution in order to keep costs down.
- The most common problems in overall spare parts management have to do with inventory management. Exhibit III-8 lists these problems reported to

SPARE PARTS INVESTMENTS AND INVENTORY LEVELS



## EXHIBIT III-8

### PROBLEMS IN INVENTORY MANAGEMENT - SMALL-SCALE SYSTEMS

Lack of Timely Data on Stock Levels

Lack of Accurate Data on Stock Levels

Inaccurate Stock-Level Forecasting

Insufficient Use Tracking

Insufficient Part Performance Tracking

Insufficient Control Over Spare Parts  
Distribution and Replenishment



INPUT by small-system vendors. Lack of sufficient management reports brought on by the dramatic growth of parts inventories is the central problem. Vendors felt that centralized automation was the key to inventory management.

#### D. SOFTWARE MAINTENANCE/INTEGRATION

- Many vendors, like IBM, are assigning software distribution and some maintenance to their field service divisions. This is done to provide a central source that the customer can go to for total service from one vendor.
- Typically, it is not the engineer in the field, but a centralized "hotline" service center that provides maintenance and distribution support. For example, Honeywell's Remote Support Update Facility provides maintenance service to users for applications and systems software.
- Users of small systems are undecided as to what the role of the FE should be in terms of software support. On one hand users rate communications with software engineers significantly lower than they do communications with hardware engineers (6.24 versus 8.02). This suggests that the personal interaction between the hardware FE and the user could be used to improve software support. On the other hand, users definitely want to restrict the FE's function to hardware support. For example, almost 60% of small-system users interviewed by INPUT opposed FEs that sell software.
- The need for centralized software support and personal interaction with the user has caused a majority of small-system vendors to begin integration of hardware and software support functions. Exhibit III-9 demonstrates the degree to which integration has been completed.

# EXHIBIT III-9

## SMALL-SYSTEM INTEGRATION OF SOFTWARE SUPPORT INTO HARDWARE SUPPORT FUNCTION

| INTEGRATION OF LARGE-<br>SYSTEM SOFTWARE<br>SUPPORT ACTIVITY | PERCENT OF<br>VENDORS<br>IMPLEMENTING | DEGREE OF<br>INTEGRATION<br>(percent) |      |
|--|---------------------------------------|---------------------------------------|------|
|  |                                       | 1983                                  | 1985 |
| Systems Software   | 60%                                   | 46%                                   | 68%  |
| Applications Software  | 53                                    | 27                                    | 47   |

- Exhibit III-9 shows that a slightly higher percentage of vendors are integrating systems software into hardware functions, than they are applications software support into the hardware function. This is caused by two factors:
  - Applications software, even when licensed by the small-system vendor, is often written by a third party. The third party usually maintains its own software support group.
  - Conversely, systems software is usually the responsibility of the vendor and is instrumental in the overall functioning of the system.
- One factor that vendors report may limit the integration of hardware and software maintenance is the variability of software. While hardware is generally quite standard, customization of software is common and limits the degree to which it can be maintained by standard maintenance procedures.
- Despite diversity in software, it is likely that vendors will move toward increased integration. Vendors reported that application software integration will lag behind system software integration, but that overall integration will grow substantially in the next three to five years.

#### E. SECONDARY SERVICES

- The trend toward remote diagnostics and component exchange will promote more efficient repair techniques, but will also reduce contact between the user and the FE. Several vendors indicated they believe user satisfaction will decrease if personal interaction between the FE and the user is reduced (even though the equipment may be more reliable). Exhibit III-10 lists some of the methods being used by vendors to maintain user contact/satisfaction.

# EXHIBIT III-10

## SECONDARY FIELD SERVICES OFFERED BY SMALL-SYSTEM VENDORS

| SERVICE                               | PERCENT OFFERED BY |      |
|---------------------------------------|--------------------|------|
|                                       | 1983               | 1985 |
| Customer Training                     | 90%                | 95%  |
| Installation Management               | 80                 | 90   |
| Facility Relocation                   | 80                 | 85   |
| Site Planning                         | 75                 | 85   |
| Site Audits                           | 60                 | 65   |
| Add-on Sales                          | 55                 | 70   |
| Consulting (Hardware<br>and Software) | 40                 | 60   |

- Customer training is the most heavily used secondary service offered by small-system vendors. Virtually all vendors offer this service and plan to increase training in the future. Even experienced users feel that this service is important. A recent survey showed that small-system users ranked customer training fourth in importance, behind hardware maintenance, software maintenance, and documentation.
- Vendors see a number of secondary services as potential revenue-generating sources. Site planning and site audits, for example, can reveal user product or upgrade requirements. While it is common for the FE to be consulted by the user, several vendors are preparing their FEs for a much more active role in the sales process.
- The FE plays a unique role in the sales process already in that he or she is looked upon as an objective source of information about new equipment and upgrades. Small-system vendors hope to exploit this role in two basic areas:
  - Sales of add-on equipment and upgrades.
  - Identification of new equipment requirements.
- Vendors interviewed by INPUT know that users will resist placing the FE in a direct sales role. To do so would give the FE conflicting interests when servicing the equipment. Fifty-three percent of small-system users, for example, oppose the FE selling supplies and 60% oppose the FE in software sales. However, over 60% of the users favor the FE selling upgrades and/or add-on equipment. Users view the selling of upgrades and add-ons as a service that will not impinge on the FE's objectives.
- A second sales support function of the FE is in the identification of new equipment requirements. Typically this is done through such secondary services as consulting, site planning, and site audits. User resistance to direct sales precludes FE involvement in this area, but the FE can be instrumental in providing new leads and contacts for the sales staff.

## F. PRODUCT PERFORMANCE OBJECTIVES

- Exhibit III-II lists the vendor responses for different measures of product performance.
- Average availability is considered by both users and vendors to be one of the standard measures of product performance. However, these two groups often define availability differently. Users typically include recovery time as a portion of the overall downtime. Vendors, on the other hand, insist that the system is available even during recovery periods. This discrepancy helps to explain why small-system users report an average availability of 94.4%, while vendors report a 97.3% availability. Despite differences in definition, both users and vendors reported that the actual percentage of system availability exceeded the objectives.
- Mean time between failures (MTBF) is a measure of product performance that vendors indicated is in need of substantial improvement. Exhibit III-II shows that actual MBTF is only 62% of the objective. Vendors said that improved manufacturing techniques and the increased use of redundancy in design would improve MBTF in the future. For now, small-system vendors are hoping to reduce callbacks by analyzing trends in failed parts and replacement procedures.
- The mean time to respond (MTTR) is another category where the actual response is worse than the objective. Vendors report that this is caused by two factors:
  - The objective takes into consideration new technology that has not been sufficiently developed at this time.
  - There is a need to keep the objective as an ideal - to strive for, but not surpass.



# EXHIBIT III-11

## SMALL-SYSTEM PRODUCT PERFORMANCE

| PERFORMANCE MEASURE                | VENDOR RESPONSE |           |
|------------------------------------|-----------------|-----------|
|                                    | OBJECTIVE       | OBJECTIVE |
| Average Availability (Percent)     | 97.0%           | 97.3%     |
| Mean Time Between Failures (Hours) | 14,280          | 8,786     |
| Mean Time to Respond (Hours)       | 5.9             | 6.4       |
| Mean Time to Repair (Hours)        | 2.9             | 4.2       |

- Remote diagnostics is a good example of new technology that affects product performance objectives. Remote diagnostics will initially reduce the mean time to repair. As development and application lag times are overcome, response time will be reduced even further.
- The second factor hindering mean time to respond is the high level of user expectations. No matter how quickly a vendor responds, some users will expect a faster response. In fact, vendors may be focusing too much on response time at the expense of productivity.
- INPUT has found that overall user satisfaction does not decrease appreciably until the mean time to respond exceeds contractual limits. Up to that point, vendors can improve FE productivity by reducing overkill (a higher level of service than the user requires). By striving for unusually good response times (e.g., one-half hour or fifteen minutes), vendors are expending precious FE time without substantially affecting user satisfaction.

#### G. FIELD AUDITS

- By 1983, 73% of the surveyed small-system vendors had instituted a formal field audit program. It is interesting to note the wide variety of ways in which these audits were conducted:
  - Survey users once a year.
  - Check out deinstalled equipment.
  - Assign specialist to travel with FE.
  - Measure callbacks.

- Review spares use.
- Spot-check incident reporting.
- In the past, field audits were relatively consistent, but today no vendor has an audit program that is exactly like any other vendor's. The large volume of equipment makes a traditional field audit very difficult. Vendors now rely on random surveys to ensure audit control. There are three standard components of the survey:
  - User opinions.
  - Supervisor reviews of field service reports.
  - Analysis of callbacks and spare use.



IV SMALL-SYSTEM FIELD SERVICE BUSINESS  
MANAGEMENT ANALYSIS



## IV SMALL-SYSTEM FIELD SERVICE BUSINESS MANAGEMENT ANALYSIS

### A. FIELD SERVICE REVENUE SOURCES

- Small-system vendors reported that revenue from field service operations was becoming an increasingly important component of total company revenue. Field service contributed an average 15% of total company revenues; service revenues are growing at almost 27% per year.
- The rapid increase in field service revenues is the result of two factors:
  - The increasing reliance on field service operations as a potential profit center.
  - Growth in the installed base of machines.
- Most small-system vendors have expanded their field service operations in order to meet the increasing needs of their customers. Honeywell's field service revenues, for example, increased 75% between 1977 and 1981 and Computervision grew by 57% in 1981-1982. Almost all the vendors interviewed by INPUT anticipate field service revenue growth in the next three to five years.
- Exhibit IV-1 lists field service revenues for major small-system vendors. Three of the vendors, IBM, Burroughs, and DEC, control almost 80% of the



EXHIBIT IV-1

KEY VENDOR SERVICE REVENUE

FISCAL YEAR 1982

| Company           | Total Information Systems Revenue (\$ Millions) | Estimated Worldwide Field Service Revenue (\$ Millions) |         |         | Field Services Growth Rate (Percent) 1981-1982 | Field Service as Percent of Total Revenue 1982 |
|-------------------|---|---|---------|---------|--|--|
|                   |   | U.S.  | Foreign | Total   |  |  |
| Auto-trol         | \$ 44   | \$ 10   | \$ 3    | \$ 13   | 30%  | 30%  |
| Burroughs         | 4,186   | 618   | 416     | 1,034   | 23   | 25   |
| Calma             | 140   | 20  | 12      | 32      | 24   | 23   |
| Computervision    | 325   | 33  | 20      | 53      | 57   | 16   |
| Data General      | 817   | 126   | 62      | 188     | 27   | 23   |
| Datapoint         | 540   | 49  | 27      | 76      | 16   | 14   |
| Digital Equipment | 3,881   | 496   | 319     | 815     | 33   | 21   |
| Four Phase        | 262   | 55  | 15      | 70      | 14   | 27   |
| Hewlett-Packard   | 2,212   | 205   | 220     | 425     | 18   | 19   |
| Honeywell         | 1,685   | 217   | 235     | 452     | 2  | 27   |
| IBM               | 34,364  | 2,276   | 1,581   | 3,857   | 18   | 11   |
| Integraph         | 156   | 12  | 6       | 18      | 70   | 12   |
| MDS               | 334   | 29  | 16      | 45      | 5  | 14   |
| NCR               | 3,526   | 554   | 533     | 1,087   | 6  | 31   |
| Perkin-Elmer      | 211   | 26  | 20      | 46      | 5  | 22   |
| Prime             | 436   | 53  | 32      | 85      | 50   | 19   |
| Tandem            | 312   | 25  | 14      | 39      | 80   | 13   |
| Texas Instruments | 1,138   | 126   | 56      | 182     | 3  | 16   |
| Total             | \$54,558  | \$4,897   | \$3,582 | \$8,479 | -  | -  |
| Average           | \$ 3,031  | \$ 272  | \$ 199  | \$ 471  | 26.7%  | 15.5%  |

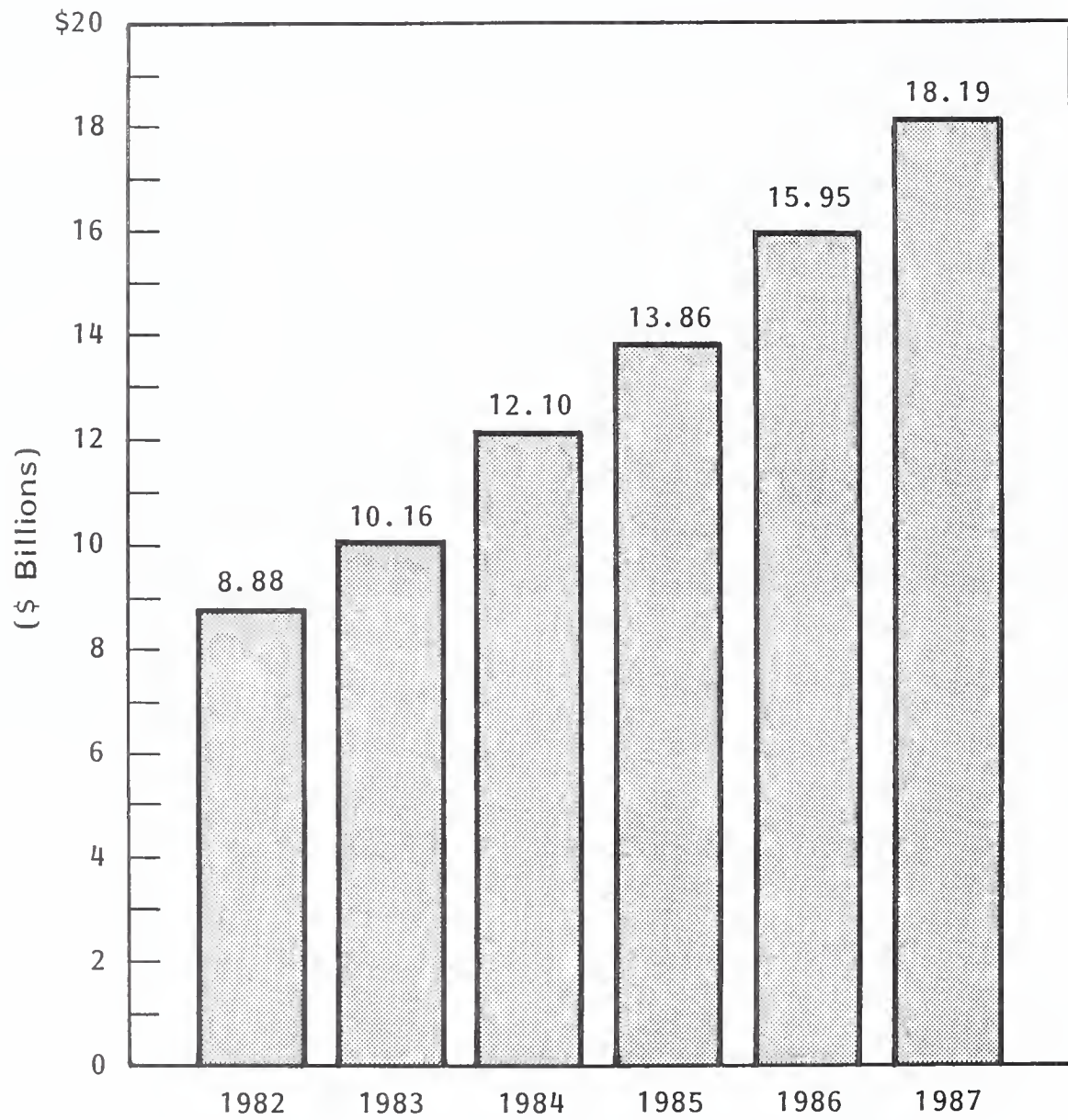
SOURCES: 1982 Annual Reports, 10Ks, INPUT Estimates

market. IBM alone has 59% of field service revenues. While these companies may dominate the market, there is room for growth.

- Most small-system vendors in Exhibit IV-1 derive a majority of their revenue from the U.S. Only Hewlett-Packard and Honeywell have a larger percentage of foreign field service revenue than domestic field service revenue. Approximately 58% of the revenues listed in Exhibit IV-1 come from the U.S.; the balance comes predominantly from Western Europe.
- The average field service revenues per company for vendors listed in Exhibit IV-1 is \$471 million. IBM is the leader with total field service revenues of \$3.8 billion. Autotrol has the lowest field service revenues - \$13 million. Tandem has the highest field services growth rate - 80%.
- INPUT estimates for U.S. field service revenue growth from 1983 to 1987 are shown in Exhibit IV-2. Although this exhibit includes data for the entire field service industry, it nevertheless still reflects an average growth in the small-system market of between 15% and 17% annually through 1987.
- A vast majority of field service revenues are derived from contract maintenance services. Other sources of revenue include:
  - Installation/deinstallation.
  - Spare parts sales.
  - Technical/management consulting.
  - Time and material charges.
- The increasing use of modular components and user self-diagnostics/maintenance may pose a threat to continued increases in field service revenues. Vendors can minimize the effect of these trends by selling an overall maintenance

EXHIBIT IV-2

FORECAST U.S. FIELD SERVICE REVENUE



nance contract that would cover all malfunctions (hardware and software), as well as offer many of the services mentioned in Chapter III.

- For vendors employing third-party maintenance, a different threat to revenues exists. Third-party organizations are already committed to secondary services (such as education/training), and are beginning to threaten vendors in such areas as parts and repair depots. These threats will be difficult to counter, particularly given the regional nature of most third-party organizations. An effective strategy to meet this threat is to expand the range of services offered to include all after-sales support.

## B. EXPENSE CONSTITUENTS

- Basic direct labor in the form of wages, incentives, and benefits make up over two-thirds of field service expenses for small-system vendors. Other major expenses include:
  - Spare parts/inventory.
  - Depreciation.
  - Travel.
  - Education/training.
  - Overhead.
- Exhibit IV-3 lists the average salaries for field service personnel in 1983. As the exhibit indicates, salary increases were fairly uniform and in the 8-10% range. Fully burdened costs for field service engineers in 1983 were up approximately 8%.

# EXHIBIT IV-3

## SALARY BY JOB TITLE: SMALL-SYSTEM VENDORS

| TITLE                     | AVERAGE<br>1983<br>SALARY | GAIN OVER<br>1982<br>(percent) |
|---------------------------|---------------------------|--------------------------------|
| Trainee                   | \$12,400                  | 8.0%                           |
| Qualified Field Engineer  | 21,300                    | 8.0                            |
| Senior Field Engineer     | 27,000                    | 8.0                            |
| Software Support Engineer | 26,000                    | 10.0                           |
| Line Manager              | 32,000                    | 6.0                            |



- Small-system vendors typically pay their field service employees less than large-system vendors, but this will change. Field service salaries from small-system vendors will increase for several reasons:
  - Increased demand for field service staff resulting from growth in small-systems sales.
  - Different skill requirements that stress fewer technical capabilities and more interpersonal skills.
  - Increased competition from large-system vendors and office product vendors.
- The cost of a typical small-system fault call in 1983, as shown in Exhibit IV-4, averaged \$245. This represents only a 2% increase over 1982. The cost of overhead actually decreased by 2% in 1983 as a result of cost-cutting measures instituted by many vendors.
- Travel expenses, travel labor, and parts/materials costs have increased by less than 2% each. Travel expenses and travel labor costs have been held down by the increasing use of remote diagnostics. One vendor reported that 11% of its service calls were diagnosed from remote locations as operator errors. In other cases, FEs can diagnose problems and repair equipment from remote locations. Both of these cases point to the increasing use of diagnostics to reduce travel-related costs.
- Parts and materials costs have remained essentially the same in 1983 as in 1982. However, vendors reported that they expect parts costs as a portion of total fault call costs to go down in the next three to five years. Improved design and production techniques will result in increased equipment reliability.



# EXHIBIT IV-4

## COST BREAKDOWN OF A TYPICAL FAULT CALL SMALL-SCALE SYSTEMS

| COMPONENT          | 1982     |         | 1983     |         | PERCENT<br>CHANGE<br>1982-1983 |
|--------------------|----------|---------|----------|---------|--------------------------------|
|                    | DOLLARS  | PERCENT | DOLLARS  | PERCENT |                                |
| Direct Labor       | \$ 60.25 | 25%     | \$ 63.70 | 26%     | 5.7%                           |
| Overhead           | 74.71    | 31      | 73.50    | 30      | (1.6)                          |
| Travel Labor       | 33.74    | 14      | 34.30    | 14      | 1.7                            |
| Travel Expense     | 21.69    | 9       | 22.05    | 9       | 1.7                            |
| Parts and Material | 50.61    | 21      | 51.45    | 21      | 1.7                            |
| Total Average Cost | \$241.00 | 100%    | \$245.00 | 100%    | 1.7                            |

- Vendors must be careful to separate field service expenses into two distinct categories: product development expenses or current product support expenses. If these two types of expenses are combined, hourly labor costs will be distorted, resulting in higher and generally uncompetitive maintenance prices.
- Development costs typically include such factors as documentation development and logistics planning. These costs should be included in the original purchase price of the product. Current product support expenses include the parts, labor, and support services necessary to meet customer needs. If development costs are included in the maintenance price, the vendor must maintain an artificially high maintenance price. Third-party organizations will then have a price advantage because they do not have the R&D costs of vendor organizations.

### C. CAPITAL INVESTMENT IN SPARE PARTS

- Eighty-five percent of the small-system vendors interviewed by INPUT indicated that they believed capital investment in spare parts would increase through 1985. These vendors cited a probable average annual increase of 16%.
- The most common explanation given for the increase in capital investment was the expected growth in new products. All of the small-system vendors agreed that within the next three to five years there will be an unprecedented growth in small systems. Increasing spare parts inventories will be an essential support mechanism.
- A second major reason for the rise in spare parts inventories is the increasing reliance being placed on small systems, particularly by the business community. Vendors feel that the users' need for high system availability will be predicated upon rapid parts availability.

- The third factor cited as causing increased parts investment is the trend toward replacing entire components rather than repairing components on-site. Vendors expressed concern about the high cost of labor and felt that the exchange-rather-than-repair policy would significantly reduce labor costs.
- Several vendors felt that while investment would increase for the next three to five years, eventually it would drop off. These vendors cited several factors that might cause inventories to decrease:
  - Shorter product life of future products.
  - Improved distribution from regional and national parts depots.
  - Increasing reliability of parts/equipment.

## V INTERNAL/EXTERNAL COMMUNICATIONS



## V INTERNAL/EXTERNAL COMMUNICATIONS

### A. MARKETING FIELD SERVICE

- Small-system vendors are realizing that field service operations can contribute significantly to the company's bottom line. As noted above in Chapter IV, section A, some companies credit over 31% of their total revenues to field service operations. And with an average growth rate of almost 27%, vendors expect field service to be a major contributor to company profitability.
- In order to sustain field service revenue growth, it will be necessary to develop new methods of marketing field services. A number of vendors have chosen the current field service staff as the natural base around which field service marketing will take place. The current staff offers a number of advantages in this new role:
  - Knowledge of the users' needs.
  - Extensive experience in maintenance at the users' sites.
  - FEs are viewed by the user as objective sources of information.
- Exhibit V-1 lists user attitudes toward small-system FEs in sales roles. Users generally favor the engineer selling add-on equipment and upgrades and are opposed to the FE selling supplies and software. User acceptance of the field



EXHIBIT V-1

USER ATTITUDES TOWARD SMALL-SYSTEM FIELD ENGINEERS  
IN A SALES ROLE

| FE SELLING              | NUMBER<br>FAVORING | NUMBER<br>NEUTRAL | NUMBER<br>OPPOSED |
|-------------------------|--------------------|-------------------|-------------------|
| Supplies                | 120                | 40                | 182               |
| Hardware Fixtures       | 207                | 24                | 111               |
| Add-On Equipment        | 195                | 25                | 122               |
| New Models of Equipment | 161                | 26                | 155               |
| Upgrades                | 206                | 27                | 109               |
| Software Packages       | 104                | 33                | 205               |

engineer in selected sales roles is an important indication of FEs' potential success in this role.

- Exhibit III-10 (above) indicates that 70% of small-system vendors will be using field service personnel in sales roles by 1985. In addition to after-market sales, field service will also be increasingly responsible for maintenance contract sales and renewals (see Chapter V, section C, below). Vendors such as Digital Equipment Corporation are offering a growing variety of maintenance contracts that are designed to be more responsive to the users' needs. Many vendors feel the FE is the logical person to explain these contracts in view of the FE's knowledge of the users' maintenance requirements.

## **B. USER CONTACT AND COMMUNICATION**

- The field engineering staff typically has more contact with the user than does any other department. In addition, there is a high correlation between overall user satisfaction and the quality of field service communication. Consequently, frequent user contact and improved communication are seen by vendors as necessary steps in improving user satisfaction.
- The user's decision to purchase is frequently based on the value of support and service, as well as on the capabilities of the system itself. The customer perceives the vendor's commitment to service and reliability as an indication of the vendor's confidence in its system.
- Frequent communications between vendor and user are crucial to a good relationship and must occur at several levels:
  - At the field engineer's level, which is the fundamental building block of the client's relationship with the vendor.

- At the field service manager's level (users feel they have a right to call upon the manager if the need arises).
- At the formal, written level, where the company must be seen to be flexible, responsive, and reasonable.
- Exhibit V-2 lists user ratings of field service managers, hardware engineers, and software engineers. The exhibit also lists rankings for overall user satisfaction with field service and maintenance.
- It is significant to note that the software engineers listed in Exhibit V-2 typically receive the lowest communication ratings by users. Vendors attribute this to several factors:
  - Software engineers rarely make on-site trouble calls. Their work is usually done via the telephone.
  - Software problems rarely have a quick fix. This slowness can cause significant system degradation, if not actual downtime.
- Even though software engineers receive the lowest communication ratings, many vendors are increasing software support without improving communication techniques. This will have an adverse effect on user satisfaction levels. For example, Auto-trol, Computervision, and Intergraph are the three companies in Exhibit V-2 that are involved in applications software (i.e., CAD-CAM) support. Not only do these companies have the lowest ratings for software engineer communication, but they also have the lowest overall service ratings.
- Some vendors, as noted earlier, are integrating hardware and software support functions into a total service concept. This is being done primarily to avoid user dissatisfaction resulting from lack of communication from any single service component.

## EXHIBIT V-2

## USER RATINGS OF FIELD SERVICE COMMUNICATION

| VENDORS           | RATINGS (1-10) |                    |                    | OVERALL SERVICE |
|-------------------|----------------|--------------------|--------------------|-----------------|
|                   | MANAGER        | HARDWARE ENGINEERS | SOFTWARE ENGINEERS |                 |
| All Vendors       | 7.30           | 8.02               | 6.24               | 7.54            |
| Auto-trol         | 6.47           | 7.05               | 4.62               | 6.19            |
| Burroughs         | 7.00           | 7.67               | 5.90               | 6.77            |
| Computervision    | 7.42           | 8.26               | 5.37               | 7.32            |
| DEC               | 7.23           | 8.35               | 6.52               | 8.03            |
| Data General      | 7.72           | 7.86               | 6.43               | 8.03            |
| Datapoint         | 8.11           | 8.10               | 7.53               | 7.65            |
| Four Phase        | 7.05           | 7.90               | 6.13               | 7.40            |
| Hewlett-Packard   | 7.25           | 8.15               | 6.89               | 7.70            |
| Honeywell         | 6.97           | 8.30               | 6.08               | 7.40            |
| IBM               | 7.69           | 8.40               | 7.09               | 8.25            |
| Intergraph        | 7.60           | 7.80               | 5.61               | 7.15            |
| NCR               | 7.80           | 8.24               | 6.11               | 7.57            |
| Prime             | 6.85           | 7.90               | 6.73               | 8.05            |
| Texas Instruments | 6.88           | 7.95               | 6.38               | 7.35            |

- As vendors increase the level of software integration and reduce on-site hardware maintenance (as a result of remote diagnostics, etc.), high communication levels must be maintained in order to preserve user satisfaction. In addition to the secondary support services mentioned above, there are a variety of techniques now being used to improve communication. They include:
  - Increased training of field service staff in interpersonal communication.
  - The establishment of more efficient hotline and dispatch centers.
  - The enforcement of strict callback and escalation procedures.
  - The measurement of user satisfaction levels on an annual or semiannual basis.

### C. CONTRACT ADMINISTRATION

- The field service organization has become a more integral part of the overall corporate operation. As field service takes a more aggressive approach to sales and marketing, and continues to focus on providing customer satisfaction, it has also found itself more involved with administering contract terms and conditions. This is particularly true with respect to exceptions to standard maintenance agreements.
- The field service representative, either engineer or manager, has an intimate knowledge of the customer's equipment and operation, and has a unique advantage for evaluating particular service needs. This provides the field service representative with the ability to select the particular contract best suited to the customer's needs.

- Contract administration is presently handled by the vendor's sales or contract department. Field service managers reported that they have practically no influence (2 on a scale of 1 to 10) on sales and maintenance, for example, in such crucial areas as the geographic placement of equipment. However, these managers report a fair amount of influence (7.3 on a scale of 1 to 10) on designing exceptions to standard maintenance agreements. Field service managers noted that the level of influence exerted by field service departments on contract negotiation is growing.
- Most of the vendors (64%) interviewed by INPUT automatically renew their maintenance contracts and a majority of the remaining 36% of vendors review contracts but do not totally renegotiate them. Almost all vendors (86%) have a normal maintenance contract period of 12 months and 93% of vendors invoice on a monthly basis.
- While most vendors invoice on a monthly basis, vendors indicated a preference for semiannual and annual invoice periods. Users, however, are adamantly opposed to this option, as shown in Exhibit V-3. Both users and vendors recognize the severe cash flow strain that an annual invoice would put on most users. However, some vendors are still pursuing this option by offering prepayment discounts.
- Currently, as shown by the statistics above, the vast majority of maintenance contracts require little or no negotiation each year. Exhibit V-3 demonstrates that there are a large portion of users who want multiyear contracts or automatic renewal. Vendors are quick to note that these users require limited contract service and that the FE on-site may be the best person to delivery whatever contract services are necessary.
- Because of the field service representative's ongoing contact with the customer, INPUT believes that the responsibility for contract renewal, negotiation, and administration should be gradually shifted from the sales or



# EXHIBIT V-3

## SMALL-SYSTEM USER RATINGS OF CONTRACT ADMINISTRATION

| CONTRACT OPTION                      | PERCENT |         |         |
|--------------------------------------|---------|---------|---------|
|                                      | FAVOR   | NEUTRAL | OPPOSED |
| Long-term Contracts<br>(Over 1 Year) | 47%     | 11%     | 42%     |
| Automatic Renewal                    | 56      | 8       | 36      |
| Annual Invoicing                     | 27      | 13      | 60      |

contract department to the field service department. At a minimum, the field service organization should be trained in this area and should play a much more active role in this function.



## VI MAINTENANCE PRICING



## VI MAINTENANCE PRICING

### A. PRICING MODELS

- As one would expect, the primary source of field service revenue is hardware maintenance, but that is followed closely by equipment relocation and installation, as indicated by Exhibit VI-1.
- Most vendors responded that they use competitive pricing information while setting their maintenance prices. Although this is certainly understandable, it is a method that in the long run could reduce profits considerably. Field service must be self-supporting if it is to stay competitive in the marketplace.
- Maintenance pricing should be based on product performance objectives that, in turn, must be established by the vendor. Different vendors, of course, cite different objectives, but all the successful field service vendors have developed extensive pricing models in order to achieve preestablished objectives.
- The pricing of field service and its components is the result of varying degrees of analysis in one or more of the following three areas:
  - Cost-based pricing (bottom up).
  - Sales-value-based pricing (top down).

# EXHIBIT VI-1

## SOURCE OF FIELD SERVICE REVENUES - SMALL-SCALE SYSTEMS

| REVENUE SOURCE                    | PERCENT OF RESPONDENTS |
|-----------------------------------|------------------------|
| Hardware Maintenance              | 100%                   |
| Equipment Relocation              | 89                     |
| Installation Fees                 | 89                     |
| Training/Documentation            | 78                     |
| Spares                            | 67                     |
| System Software Maintenance       | 44                     |
| Supplies                          | 39                     |
| Applications Software Maintenance | 22                     |



- Market-based pricing (either IBM price umbrella, competition, or "what the market will bear"). This requires the least analysis and is probably the most commonly used.
- Exhibit VI-2 outlines the thought process used in each of the above three means of pricing.
- Exhibit VI-3 cites several examples of vendor maintenance pricing of mini-computer systems priced less than \$25,000.

## **B. FREQUENCY OF PRICE CHANGES AND RECENT TRENDS**

- As the reliability of small-scale systems has increased and the price of hardware has decreased, users have become more resistant to maintenance price increases on standard shift contracts. This tendency will continue. The resistance to price increases will take the form of an expectance of service price decreases that are compatible with continued hardware price decreases and higher system reliability.
- Vendors that base their maintenance prices on the percent of purchase value of installed equipment or on costs and profit margins usually review and change maintenance prices annually.
- Vendors that base their maintenance prices on competitive analysis are continuously monitoring the competition and reacting accordingly.
- The notice period for price increases ranges from 60 to 120 days.
- Three-fourths of the respondents cited price adjustments that were on an annual basis, as shown in Exhibit VI-4.

# EXHIBIT VI-2

## SMALL-SCALE SYSTEMS PRICING METHODOLOGY

### PRINCIPAL STARTING POINT

|   |
|---|
| COSTS   |
| Fully burdened costs based on measured MTBF, MTTR, actual cost of spares, and cost of delivery. |

### MODIFIED FOR:

|                                    |
|------------------------------------|
| Fixed margin                       |
| What competition is charging       |
| Other (e.g., corporate objectives) |

Adjusted For

|                                 |
|---------------------------------|
| What market will bear           |
| Accepted percent of sales value |

|  |
|--|
| SALES VALUE  |
| Percent of sales value, fixed either by product line or type of product. |

|  |
|--|
| Actual costs, when known                           |
| Competition  |
| Other (e.g., Impact of customer cost of ownership) |

|                              |
|------------------------------|
| COMPETITION                  |
| What competition is charging |

|                    |
|--------------------|
| Viability of costs |
|--------------------|

|   |
|---|
| OTHER   |
| e.g., what market will bear, IBM price umbrella, etc. |

|         |
|---------|
| Various |
|---------|

# EXHIBIT VI-3

## MAINTENANCE PRICING OF SELECTED VENDORS OF SMALL BUSINESS AND MINICOMPUTER SYSTEMS UNDER \$25,000

| VENDOR               | MODEL<br>NUMBER | MEMORY SIZE<br>OF BASIC<br>CONFIGURATION | AVERAGE<br>PURCHASE<br>PRICE | AVERAGE<br>MONTHLY<br>MAINTENANCE<br>CHARGE | ANNUAL<br>MAINTENANCE<br>AS PERCENT<br>OF PURCHASE<br>PRICE |
|----------------------|-----------------|--|------------------------------|---|---|
| IBM                  | System/32       | 8 KB                                     | \$23,490                     | \$168                                       | 8.6%  |
| Texas<br>Instruments | DS 990          | 64 KB                                    | 9,995                        | 114   | 13.7  |
| Wang                 | VS-100          | 256 KB                                   | 22,000                       | 235   | 12.8  |
| Basic Four           | System 200      | 40 KB                                    | 24,990                       | 260   | 12.5  |
| Burroughs            | B 90            | 128 KB                                   | 7,900                        | 56  | 8.5   |
| NCR                  | 8150            | 32 KB                                    | 18,300                       | 192   | 12.6  |
| Hewlett-<br>Packard  | 3000/30         | 256 KB                                   | 24,925                       | 220   | 10.6  |
| DEC                  | Data System 336 | 128 KB                                   | 25,000                       | 242   | 11.6  |

EXHIBIT VI-4

FREQUENCY OF MAINTENANCE PRICE CHANGES

| FREQUENCY     | PERCENT OF RESPONDENTS |
|---------------|------------------------|
| Annually      | 77%                    |
| Every 2 Years | 15                     |
| Every 3 Years | 8                      |

### C. DISCOUNTS RELATED TO DELIVERY METHODS

- As the price performance of hardware components continues to increase and as reliability and maintainability improve, users expect a decrease in field service charges or, at the minimum, a decrease in their rate of increase.
- User expectations of decreased maintenance costs will conflict with ongoing vendor expectations of increased field service profitability. Discounting field service pricing is used to satisfy both groups. Discounts almost always rely on some user involvement in the system repair process and consequently discounts result in lower labor costs for the vendors.
- Exhibit VI-5 demonstrates the various discounts offered by small-system vendors. Forty percent of the small-system vendors interviewed by INPUT offered some type of maintenance discount to users. These discounts ranged up to 30% of the overall maintenance price.
- Small-system users typically do not favor being involved in the repair process, as noted above in Exhibit III-5. For example, delivery of modules to repair centers was rated at 4.0 (on a scale of 1-low, 10-high) by users. Some vendors, on the other hand, offer up to a 30% discount for user involvement in this area. Clearly, vendors do not expect all users to take advantage of discounts. This pricing policy is designed to provide an option for cost-conscious users.
- Several vendors pointed out that increased user involvement will be necessary as field service labor costs increase and as there is a greater reliance on remote diagnostics. As this trend develops, more and more companies will offer discounts in these areas. Vendors speculated that within five to seven years some discounts will be standardized and users not willing to be involved in some form of self-maintenance will be forced to pay premiums.

# EXHIBIT VI-5

## FIELD SERVICE DISCOUNT PRACTICES

| ACTIVITY  | PERCENT OFFERING | AVERAGE PERCENT DISCOUNT OFFERED |
|---|------------------|----------------------------------|
| User Assistance in Remote Diagnostics             | 40%              | 30%                              |
| User Replacement of Plug-in Modules               | 36               | 30                               |
| User Delivery of Plug-in Modules to Repair Center | 30               | 10                               |
| Relaxed Requirement on Response Time              | 33               | 25                               |
| User Purchase of Spare Parts Kits                 | 30               | 15                               |

#### D. ELASTICITY OF FIELD SERVICE PRICING

- As the prices of small-scale systems decline, most users expect a containment of field service prices.
- The argument for lower prices includes:
  - Higher reliability of the hardware.
  - Easier maintenance of the hardware.
  - Remote diagnostics and user participation in hardware maintenance.
- The argument for higher prices includes:
  - Labor costs increasing as a percentage of total field service costs.
  - The increasing nontechnical skill requirements of field engineers.
  - Increasing labor rates.
  - Increasing travel expenses.
  - Return-on-asset requirements of the field service organization as a profit center.
- Vendors acknowledge that most users will actively consider alternative sources of maintenance if the price of the vendor's service is significantly above the industry average. Exhibit VI-6 lists the vendor's estimation of user price sensitivity.



EXHIBIT VI-6

SENSITIVITY OF FIELD SERVICE PRICING

| PERCENT<br>MAINTENANCE<br>PRICE TO<br>UNIT PRICE |   |
|--|---|
| 15%  | User will actively consider alternative sources.                                |
| 18   | Users will definitely contract with third party or will maintain own equipment. |
| 22   | Users will refuse to buy the original product, given the option.                |

- Most small-system vendors charge in the area of 10 to 14% of purchase price for annual maintenance, as shown in Exhibit VI-3. Exhibit VI-6 indicates that if maintenance prices increased to 15% of purchase price, users would probably consider alternative sources of maintenance. If prices go up to 18%, users will definitely contract with alternative sources of maintenance. At 22%, users would refuse to buy the original product.
- Exhibit VI-6 demonstrates that small-system vendors realize the price sensitivity of their users, particularly when it comes to hardware and software maintenance. Pressures to maintain a profitable field service operation may tempt vendors to raise maintenance prices, but user resistance will force even the largest small-system vendor to keep service prices down.



## VII VENDOR CASE STUDIES



## VII VENDOR CASE STUDIES

### A. DATA GENERAL

- The highly touted turnaround at Data General has been sparked, at least in part, by an aggressive field service strategy. DG has increased its field service staff dramatically in order to handle new hardware products, software service, and a variety of other service-related changes.
- The number of field engineers at DG has increased from 1,495 in 1981 to over 2,000 in 1983 - a 34% increase in less than three years. INPUT estimates that growth will continue for the next two to three years.
- The Field Engineering Division is the second largest in the company, with 1982 revenues of \$188 million (or 23% of total revenue). Field engineering is also one of the fastest growing divisions at DG. Between 1978 and 1982, field service revenues increased 350% and more than doubled as a percentage of the total company revenue.
- Growth in field service personnel and revenue is the direct result of a definite policy of expanding and improving field service at Data General. The company is increasing its emphasis on the end-user marketplace, particularly in the small-business and office automation markets. Users in these field require a much higher level of service than do users of DG's other major products (OEM-oriented supplies).

- Data General is expanding or improving service in several different areas:
  - Remote diagnostics.
  - Software support.
  - Variety of maintenance agreements.
  - Component/subassembly replacement policy.
- With the introduction of new products, DG has definitely committed itself to the use of remote diagnostics. DG's new 32-bit machine, the MVI0000, has a service called Remote Assistance, which is designed to diagnose and even solve some problems directly over the phone.
- Increased software support was necessary for several reasons:
  - The increasing demand for integration of software support into the hardware service function.
  - Data General's growing sales and use of non-DG-produced software.
- DG has established an On-Line Information Service (OIS), a remote software support service based in Atlanta. This service was considered particularly necessary for the support of independently produced software packages. INPUT projects that DG's reliance on independent software is likely to increase substantially in the future, as will DG's field service support of these programs.
- A third major service expansion offered by DG is its increased variety of maintenance agreements. From their desktop microcomputer to the MVI0000 supermini, DG offers a series of maintenance agreements based on the users' needs. Some of these service agreements include:



- On-Call (a standard 8 to 5 maintenance agreement).
  - Critical Response (MV/10000) (96% guaranteed uptime).
  - Maximum Uptime (MV/10000) (99% guaranteed uptime).
  - On-Call Multidevices (discount offered in multidevice shops).
- Data General surveys all their users once a year to determine satisfaction with the different types of maintenance agreements.
  - While DG trains its FEs for component-level repair, its basic service plan assumes the subassembly replacement of parts. To this end, DG has developed an extensive parts network based on automated warehouses and well-stocked district offices. Data General expects to maintain a large inventory in order to support users that are becoming increasingly dependent upon their computers. In 1982 alone, DG stated that it sold or replaced more than \$100 million worth of spare parts.
  - INPUT projects continued growth in the Data General field service division. Growth will be fueled by entry and expansion in new markets, the availability of new products, and a continuing reappraisal of the users' service/maintenance needs.

## **B. HEWLETT-PACKARD**

- Hewlett-Packard has consistently maintained one of the highest rated field service organizations in the industry. Users are particularly satisfied with overall system availability, the high level of communication with FEs, and ancillary services (such as site planning, consulting, etc.).

- HP's objectives in adapting to the changing field service marketplace include:
  - Development of remote diagnostics and guaranteed uptime services.
  - Dealer training in maintenance of personal computers.
  - Extensive software support services.
- Users of HP equipment rank reliability and performance as the two most important considerations in selecting computer equipment. It is no coincidence that HP was the first company to offer a guaranteed uptime service (GUS) of 99% to its HP 3000 users. Not only does this service advertise the reliability of the HP 3000, but it also promotes the image of HP as a user-oriented field service vendor.
- HP guarantees a four-hour response time for the guaranteed uptime service, although INPUT found that even without GUS, HP users were getting a response time of under three hours. The above-average response time combined with mandatory remote diagnostics and local-area support has ensured the success of this program.
- The HP-150 personal computer is the latest indication that Hewlett-Packard views the PC market as vital to the company's growth. An unprecedented amount of advertising and extensive growth in dealer support systems demonstrate a substantial commitment to the PC market. An expansion of the level of service offered to dealers is the second major field service strategy at HP.
- HP designed the Authorized Dealer Repair Center program so that dealers could provide several levels of support without having to maintain extensive part inventories. Dealers, for the first time, will be trained by HP to service personal computer products. In addition, HP will provide FE support at the dealer's site.

- The third major strategic goal in HP field service is in the area of software support. Hewlett-Packard offers a number of software support programs, including:
  - Customer Support Service (CSS), a comprehensive software support service providing telephone consulting, on-site software support, software updates, and documentation.
  - Software Subscription Service, which provides updates and documentation for HP software.
  - System Information Service, a software and firmware support service designed specifically for desktop and personal computers.
- In addition to the three objectives mentioned above, it appears likely that HP will maintain its traditional level of service through service responsibility offices and at field repair centers. INPUT expects these sources to provide most maintenance on HP's large systems and peripheral products; dealers will expand support for personal computers.

### C. PRIME

- Like other small-system vendors, Prime Computer is finding that expanded field service networks are both necessary and profitable. The field service staff has grown from 226 in 1979 to over 700 today. Revenue from field service operations have increased 165% since 1980. In 1982, field service revenue represented almost 20% of total revenue at Prime.
- The major emphasis of field service growth at Prime has been in the design and implementation of improved reliability for services. These include:

- Remote diagnostics.
  - Preferred service plan.
  - Guaranteed response time and uptime.
- Remote diagnostics are an integral part of new systems development and are used on both hardware and software. Management believes that remote diagnostics are a key element in controlling service costs. According to Prime's annual report, 86% of software problems and 30% of hardware problems have been resolved through remote fixes.
  - On newer products, such as the 2250, remote diagnostics are mandatory (Prime will supply the communications hardware); however, remote diagnostics are optional on other systems.
  - The Preferred Service Plan was introduced in 1982 and includes such services as site planning, installation, and preventive maintenance. Prime users that select preferred service also receive a guaranteed two-hour response time and a toll-free hotline covering software and hardware problems. Basic service, the alternative to the preferred services plan, provides next-day, on-site response. Although initially limited to the 2250, the preferred services plan was extended to the entire "50" series in January 1983.
  - Another aspect of the preferred services plan is the high availability option (HAO). This is a 99% uptime guarantee that includes hardware and PRIMOS software. Twenty-four-hour, seven-days-a-week (24x7) coverage and special environmental controls are required. Currently, HAO is offered only for the 2250 and 9950 models.
  - Parts inventories have been increased substantially (up 66% in 1982 alone) in order to support the extended field service network designed by Prime. This

increase has also been necessary because of the company policy of supporting all machines that have ever been manufactured by Prime.

- One factor that will have a significant effect on field service is the amount of third-party applications software being sold by and/or supported by Prime. Through its joint promotion performance pool and its developer program, Prime has solicited and promoted third-party software. With more than 700 software programs available on Prime systems, demand for software support is expected to increase.

#### D. INTERNATIONAL BUSINESS MACHINES

- IBM is by far the largest vendor of computer equipment, with total worldwide sales of over \$34 billion for fiscal year 1982 and 364,796 total worldwide employees.
- 1982 U.S. field service revenues have been estimated at \$3.8 billion dollars, which alone would make IBM the 98th largest U.S. industrial corporation.
- IBM divides responsibility for field service into two separate divisions, both headquartered in Franklin Lakes (NJ). The field engineering division is responsible for maintenance and support of all intermediate and large systems, while the customer service division is responsible for smaller systems, telecommunications equipment, and office products.
- IBM was instrumental in the advancement of built-in diagnostics, remote support, field service communications, improved field engineer training, and automated spare parts storage and distribution centers. IBM found it necessary to develop the above field service areas because of company size. IBM also wanted to provide quality service for the market and to move toward P/L control at the field service level.



- IBM has been very active in improving the education and training of its field service staff. Using computer-based training programs, along with videodisks, film strips, audio cassettes, and written materials, students are given self-paced instruction that includes classroom and hands-on training. In-house education achieves two major goals for IBM: first, it assures that IBM field service personnel are up to date on current service techniques. Second, it reduces the strain caused by the dramatic increase in demand for qualified field service personnel.
- Another area in which IBM satisfies users is spare parts availability. IBM instituted an automated central parts and publications storage and distribution center that handles 2.5 million parts and 24 million publication requests annually. The entire storage and distribution operation is controlled and monitored by a computer that keeps track of inventory location and movement. IBM has found that the above arrangement can drastically reduce inventory space and provide better access and control of spares.

#### E. DIGITAL EQUIPMENT CORPORATION

- DEC manufactures a wide range of computer equipment, from microcomputers (DEC Rainbow) to large mainframes (DEC system-20).
- By July 2, 1983, DEC employed a total of 73,000 persons, with an estimated field service total of 15,000 employees.
- Total company revenues for the fiscal year ending July 2, 1983 were just under \$3.9 billion worldwide (of which \$2.8 billion were U.S.). This was an increase of 10.1% over fiscal year 1982 revenues.

- Worldwide field service revenues for fiscal year 1983 were \$815 million, an increase of 33% over fiscal year 1982. Of that total, U.S. field service revenues were approximately \$500 million dollars.
- DEC offers a variety of guaranteed uptime agreements on their equipment. To be eligible, customers must sign up for remote diagnostics, environmental and physical site planning, and the appropriate error analysis and logging program. Users can choose from four specified system uptime percentages - 96%, 97%, 98%, or 99%, with no additional charge for the guarantees. To receive the 96% uptime guarantee, the customer need only meet the basic requirements already listed. To receive the increased uptime guarantees, the customer must only increase the amount of service coverage.
- Another service option made available by DEC is user self-maintenance. DEC provides documentation, maintenance aids, spares inventory guidance, field changes, repair instruction, and other backup support for customers who for any reason feel that they need to provide their own maintenance.
- DEC has also announced that it will provide maintenance on certain non-DEC products incorporated into DEC systems. At the present time, DEC will provide installation, warranty, and maintenance service on certain printers, disks, tape drives, controllers, and communication devices from vendors such as Printronix, Control Data Corporation, Emulex, and Able Computer Inc. This move was in response to customer requests for a more coordinated service effort. DEC stresses, however, that it is not endorsing the purchase and use of competitive products, nor will DEC become a service agent for competitors.





## VIII RECOMMENDATIONS



## VIII RECOMMENDATIONS

### A. USER REQUIREMENTS

- Small-system vendors typically deal with one of the most diverse groups of users in the computer industry. These users may have a great deal of computing experience or they may be novices. Their data processing requirements may be critical to the company's business or they may be an ancillary service. It is essential for the small-system vendor to know what the users require for maintenance and support.
- Some of the services that users require may not be acceptable to the vendor. For example, in a recent INPUT survey, 37% of the small-system users said they had a requirement for preventive maintenance and field changes during off hours. The cost of the service, however, does not appear to be compatible with the premium of 3.3% that users were willing to pay. The vendor must bear in mind that user needs should be useful guidelines, not firm obligations.
- The best compromise that can be achieved when attempting to fulfill users' requirements is to try to group users by their service needs, e.g.:
  - Those that require one-hour response time.
  - Those that expect system availability guarantees.

- Those that require full, on-site service.
- Those that are price sensitive.
- Exhibit VIII-1 lists the user reaction to some of the contract options proposed by INPUT. Each option was evaluated by users in terms of their need for the service (percent of users) and in terms of the percentage of the monthly maintenance charge (MMC) that users say they would agree to pay in order to receive the service.
- What is important to note about the data behind Exhibit VIII-1 is the diversity in user responses. Almost all the users indicated that they required some of the services listed in Exhibit VIII-1, but very few said they needed all the services. Each vendor needs to know its users' special requirements and use these as a guideline to structuring new service options that make good business sense. Knowledge of the users' needs provides the opportunity to control the customer's entire account through single-source maintenance.

## B. ACCOUNT CONTROL THROUGH SINGLE-SOURCE MAINTENANCE

- The use of single-source maintenance contracts provides a strategic advantage in the fight for control of small-scale system accounts: many small-scale sites are multiple-vendor sites, and customers generally find this single-source approach appealing (it depends on the vendor, as shown in Exhibit VIII-2).
- The advantage provided is that, irrespective of the immediate third-party maintenance service intentions of the vendor, the option to move into that business is left open until events show that such an option (e.g., product installation density, revenue base growth, etc.) is viable. If another vendor has made that move, no such option exists because the only user service contract is with another vendor.

# EXHIBIT VIII-1

## SMALL-SYSTEMS MAINTENANCE CONTRACT OPTIONS - ALL VENDORS

| OPTION                          | PERCENT<br>OF USERS<br>NEEDING | PREMIUM<br>(Percent MMC) |
|---------------------------------|--------------------------------|--------------------------|
| Standby Coverage                | 21.4%                          | 5.6%                     |
| Guaranteed Uptime               | 19.5                           | 5.8                      |
| Guaranteed Response Time        | 38.9                           | 4.1                      |
| Remote Diagnostics              | 26.6                           | 4.3                      |
| PM/ECO in Off-prime             | 37.1                           | 3.3                      |
| Occasional Shift Coverage       | 14.6                           | 2.5                      |
| Guaranteed Hardware Repair Time | 24.3                           | 4.6                      |

## EXHIBIT VIII-2

## USER RATINGS OF IMPORTANCE OF SINGLE SOURCE OF MAINTENANCE

| VENDORS           | MEAN<br>RATING<br>(1-10) |
|-------------------|--------------------------|
| All Vendors       | 8.05                     |
| Auto-trol         | 8.04                     |
| Burroughs         | 8.53                     |
| Computervision    | 8.31                     |
| DEC               | 8.48                     |
| Data General      | 7.67                     |
| Datapoint         | 8.75                     |
| Four Phase        | 7.37                     |
| Hewlett-Packard   | 7.85                     |
| Honeywell         | 8.20                     |
| IBM               | 8.22                     |
| Intergraph        | 8.40                     |
| NCR               | 8.48                     |
| Prime             | 7.70                     |
| Texas Instruments | 6.74                     |



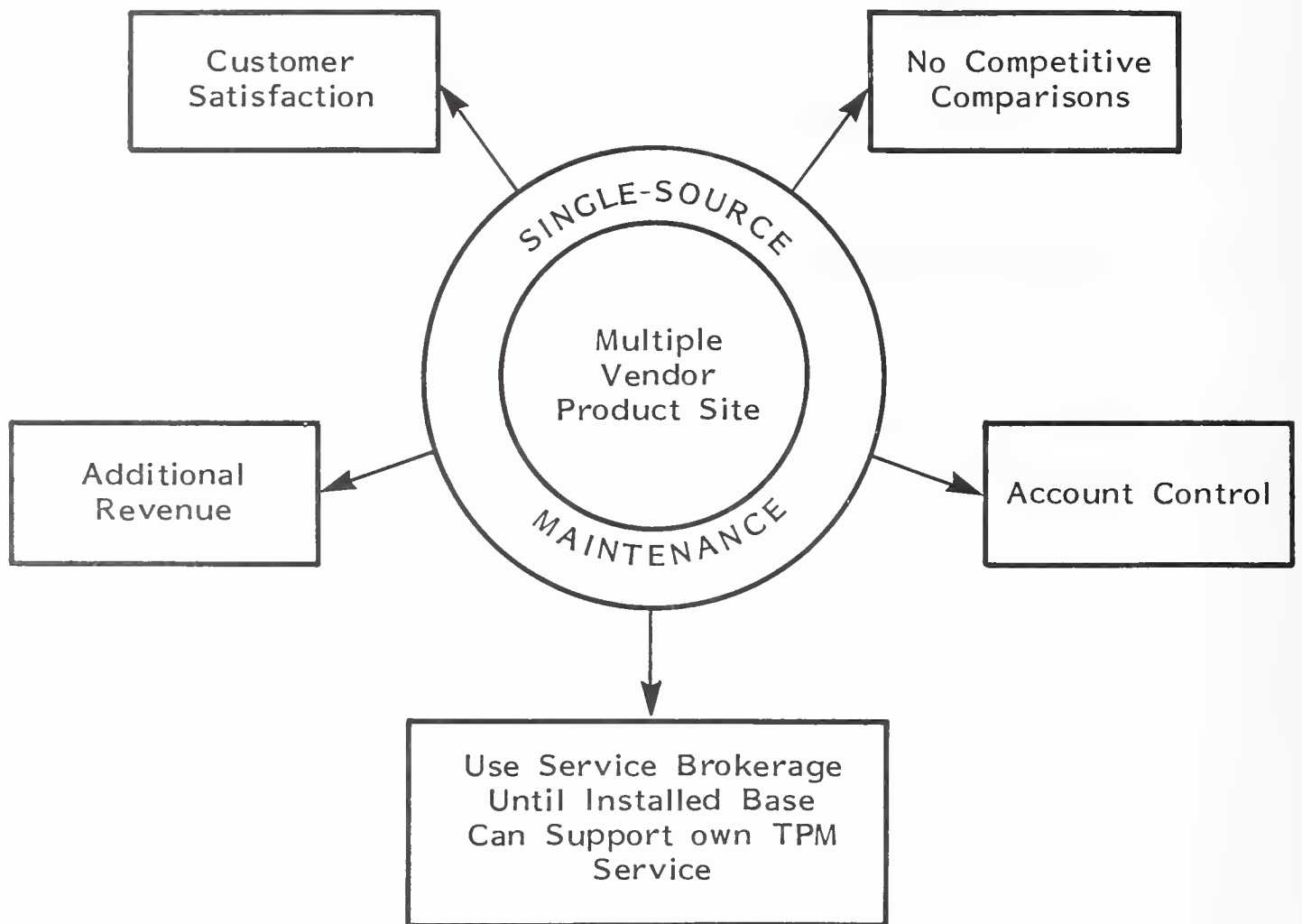
- The other advantages that single-source maintenance offers are shown in Exhibit VIII-3 and include:
  - Additional revenue (even if the foreign product service is only brokered, a 10% surcharge is usually levied).
  - Elimination of competitive service vendors.
  - Customer satisfaction.
  - Account control (above all).

### C. SYSTEM AVAILABILITY GOAL SETTING

- One useful tool for developing an understanding of each user's service requirements is the use of goal setting. This is a widespread practice in most aspects of today's business environment but one that vendors appear reluctant to implement with their user base. It should be made clear that the goals, once set, are not a contractual obligation between vendor and user, but only a goal that each will strive to meet.
- The formulation of these goals must entail specific performance objectives in terms that user and vendor agree on. In this contest it should be noted that the user often has a different definition of service measurements, for example "repair time." (Users often refer to repair time as the time between the onset of failure and the system coming up again; vendors carefully divide repair time into response time and repair time, at least). Sometimes vendors even eliminate from repair time the time needed to obtain a part.

EXHIBIT VIII-3

ADVANTAGES OF SINGLE-SOURCE MAINTENANCE



- Perhaps the best goal that users and vendors can readily agree on is system availability (or scheduled use divided by the total of actual use, downtime, and recovery time). This essentially puts a value on the question "What do I, as a user, want my system to do for me?" The attraction is that it is far easier for the vendor to design a service contract that targets the users' needs, including special options (at a premium) that complement standard service contract provisions.
- The other benefit of system availability goal setting is that it provides a forum for regular discussion between the user and the vendor on the performance of the system, on the level of user dissatisfaction, and on the need for improvements, etc. Much of this dialogue is currently lost because of the lack of opportunity for users to express their needs.
- Vendor performance measures will be based in large part on field service staff productivity. In developing productivity measurement techniques, vendors must be careful not to rely exclusively on quantitative measurements such as mean time between failure (MTBF). Other factors, such as quality assurance, customer satisfaction, and financial productivity must be included in order to accurately judge staff productivity.
- Even after goals have been established, vendors must continually review customer satisfaction. Measurements of user resistance to self-help procedures are particularly important. If users perceive neglected maintenance - even if previously agreed upon with the vendor - they will probably turn to another source of maintenance. This is important when services such as remote diagnostics reduce vendor-user communication.
- A potential solution to user alienation is to increase the number of services offered by field service and to periodically query the customer base as to its satisfaction with service and maintenance.

#### D. REVISED MARKET SEGMENTATION

- It is customary for vendor organizations to segment their target markets according to some classical divisions:
  - Industry sector (e.g., banking, transportation, insurance, etc.).
  - Company size (e.g., Fortune 1000 companies).
  - Product market (e.g., minicomputers, small business systems).
  - Model (e.g., HP 3000 market).
- When organizing market planning for field service it may make sense to consider a new set of market segments, e.g.:
  - Data dependence: where users are heavily dependent on the accuracy and/or timeliness of the data processed by a given machine, there is a tendency to concentrate more on the system's performance, rather than on the cost of service. Requiring service products that meet these performance goals is worthwhile since this will be a high revenue opportunity area.
  - Visible-need maintenance products: these are products for which the user has a clear understanding of the need for maintenance (e.g., printers). These generally high-use, high-performance devices obviously need continuous monitoring and ongoing service to ensure maximum use (particularly since the accuracy of output is essential to many applications).
  - Low-failure/low-dependency products: these are services that can fail without significant impact on the system's performance (e.g., a single

terminal); service to these devices can be accomplished off-line, via the temporary use of replacement terminals or bases. Service rates must be competitive for these devices. In general, the idea is to isolate markets on which to spend both extra effort and contract design time, since the payback can be well worth the effort.

## E. POSTSALES SUPPORT

- Concentrating postsales support responsibilities on the field service organization may appear to be a revolutionary step. In actual fact it is nothing more than the extension of the concentration of service that has already begun with the integration of systems software support and the hardware maintenance function.
- Users benefit in that all of their requirements, needs, comments, and criticisms are channeled to the vendor through a single conduit: the FE (or perhaps more properly, the customer service source representative).
- The benefits to the company are the increased visibility of gains in user base and the improved productivity of sales and service personnel, each of which now has clearly defined responsibilities.
- The drawback of such an approach is marketing's (natural) reluctance to relinquish account control. This reluctance will mean that the move to total service will be a long and sometimes painful one, but one that appears to be inevitable.



## APPENDIX: QUESTIONNAIRE





## A. General Management

1. Please check all of the direct services you currently offer or plan to offer in the near future.

| DIRECT SERVICE OFFERED  | 1983  | BY<br>1985 | BY<br>1987 |
|---|-------|------------|------------|
| a) Third-party maintenance  | _____ | _____      | _____      |
| b) Facility maintenance management                                | _____ | _____      | _____      |
| c) Guaranteed availability (uptime)                               | _____ | _____      | _____      |
| d) Guaranteed response time                                       | _____ | _____      | _____      |
| e) Guaranteed repair time (hardware)                              | _____ | _____      | _____      |
| f) On-site standby  | _____ | _____      | _____      |
| g) Variable shift coverage (versus fixed schedules)               | _____ | _____      | _____      |
| h) On-site spares   | _____ | _____      | _____      |
| i) Guaranteed turnaround on software repairs                      | _____ | _____      | _____      |
| j) Remote diagnostics   | _____ | _____      | _____      |
| k) Preventive maintenance and field changes during nonprime hours | _____ | _____      | _____      |
| l) System software maintenance                                    | _____ | _____      | _____      |
| m) Application software maintenance                               | _____ | _____      | _____      |
| n) Depot maintenance (pickup)                                     | _____ | _____      | _____      |
| o) Depot maintenance (carry/mail)                                 | _____ | _____      | _____      |
| p) Local area network maintenance                                 | _____ | _____      | _____      |

2. Please check the ancillary services your field service organization offers or plans to offer in the near future. Also, for those services you currently provide, please indicate the level of quality you believe that your users would give you. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

| ANCILLARY SERVICES OFFERED                   | BY 1985 | BY 1987 | 1983  | ON A SCALE OF 1-10, USERS WOULD RATE YOU |
|--|---------|---------|-------|--|
| a) Environmental planning                    | _____   | _____   | _____ | _____                                    |
| b) Physical site planning (layouts)          | _____   | _____   | _____ | _____                                    |
| c) Consulting services (hardware)            | _____   | _____   | _____ | _____                                    |
| d) Consulting services (software)            | _____   | _____   | _____ | _____                                    |
| e) Customer training                         | _____   | _____   | _____ | _____                                    |
| f) Installation management and coordination  | _____   | _____   | _____ | _____                                    |
| g) Supplies sales                            | _____   | _____   | _____ | _____                                    |
| h) Add-on sales (additional equipment)       | _____   | _____   | _____ | _____                                    |
| i) Upgrade sales (new equipment or features) | _____   | _____   | _____ | _____                                    |
| j) Site audits                               | _____   | _____   | _____ | _____                                    |
| k) Facility relocation                       | _____   | _____   | _____ | _____                                    |
| l) De-installation                           | _____   | _____   | _____ | _____                                    |
| m) Software sales                            | _____   | _____   | _____ | _____                                    |
| n) Ancillary equipment sales and service     | _____   | _____   | _____ | _____                                    |

3. How do you rate your field service organization in the following categories, and how do you believe your users would rate you in the same categories? (Scale 1-10: 10 = excellent, 5 = average, 1 = very poor.)

| CATEGORIES RATED:<br>(service over the past 12 months)               | RATING (1-10) |                      |
|--|---------------|----------------------|
|  | SELF RATING   | EXPECTED USER RATING |
| a) Management's communication with users                             | _____         | _____                |
| b) Hardware service engineer's communication                         | _____         | _____                |
| c) Software service engineer's communication                         | _____         | _____                |
| d) Ability to diagnose hardware problems and to make quality repairs | _____         | _____                |
| e) Ability to maintain software                                      | _____         | _____                |
| f) General responsiveness of the organization to user requirements   | _____         | _____                |
| g) Overall service image   | _____         | _____                |
| h) Taking initiative to improve user operations                      | _____         | _____                |
| i) Resolution of invoicing disputes                                  | _____         | _____                |
| j) Dispatching trouble calls   | _____         | _____                |
| k) Escalation procedures during extended outages                     | _____         | _____                |

4. Please either respond to the following questions or provide us with a functional organization chart (space is provided on the reverse side of this page for your sketch if that is more convenient for you).

| FUNCTION                             | (√)<br>IF NOT<br>FS | TITLE | REPORTS TO<br>(title/function) |
|--------------------------------------|---------------------|-------|--------------------------------|
| a) Top-level field service executive | _____               | _____ | _____                          |
| b) Top-level domestic line executive | _____               | _____ | _____                          |
| c) Top international line executive  | _____               | _____ | _____                          |
| d) Field support, general            | _____               | _____ | _____                          |
| e) Field support, hardware           | _____               | _____ | _____                          |
| f) Field support, software           | _____               | _____ | _____                          |
| g) Financial operations              | _____               | _____ | _____                          |
| h) Administration                    | _____               | _____ | _____                          |
| i) Logistics                         | _____               | _____ | _____                          |
| j) Operations analysis               | _____               | _____ | _____                          |
| k) Education                         | _____               | _____ | _____                          |
| l) Personnel                         | _____               | _____ | _____                          |
| m) Field service marketing           | _____               | _____ | _____                          |
| n) Engineering liaison               | _____               | _____ | _____                          |
| o) OEM liaison                       | _____               | _____ | _____                          |
| p) Legal                             | _____               | _____ | _____                          |
| q) Other _____                       | _____               | _____ | _____                          |
| r) Other _____                       | _____               | _____ | _____                          |

5. Lower level management and employees are encouraged by some companies to participate in the following activities. Please check those that apply now and in the near future for your company. (Enc. = Encouraged, Mand. = Mandatory.)

| ACTIVITIES   | 1983  |       | 1985  |       | 1987  |       |
|--|-------|-------|-------|-------|-------|-------|
|  | ENC.  | MAND. | ENC.  | MAND. | ENC.  | MAND. |
| a) Making good-will calls on users                   | _____ | _____ | _____ | _____ | _____ | _____ |
| b) Selling maintenance contracts                     | _____ | _____ | _____ | _____ | _____ | _____ |
| c) Accompanying sales personnel on sales calls       | _____ | _____ | _____ | _____ | _____ | _____ |
| d) Attending sales meetings                          | _____ | _____ | _____ | _____ | _____ | _____ |
| e) Furthering formal education                       | _____ | _____ | _____ | _____ | _____ | _____ |
| f) Making public appearances                         | _____ | _____ | _____ | _____ | _____ | _____ |
| g) Joining organizations such as AFSM, Jaycees, etc. | _____ | _____ | _____ | _____ | _____ | _____ |
| h) Reading trade journals                            | _____ | _____ | _____ | _____ | _____ | _____ |
| i) Other _____                                       | _____ | _____ | _____ | _____ | _____ | _____ |
| j) Other _____                                       | _____ | _____ | _____ | _____ | _____ | _____ |
| k) Other _____                                       | _____ | _____ | _____ | _____ | _____ | _____ |

## B. Field Support/Product Support

1. Please rate the trends of the influence of your field service management in the following company activities relative to small systems. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

| ACTIVITIES                                       | RATING (1-10) |       |                  |
|--|---------------|-------|------------------|
|  | 1982          | 1983  | EXPECTED<br>1984 |
| a) Product specification                         | _____         | _____ | _____            |
| b) Product design                                | _____         | _____ | _____            |
| c) Serviceability design                         | _____         | _____ | _____            |
| d) Documentation                                 | _____         | _____ | _____            |
| e) Diagnostic development                        | _____         | _____ | _____            |
| f) Selection of test equipment                   | _____         | _____ | _____            |
| g) Spares requirements                           | _____         | _____ | _____            |
| h) Geographic control of sales                   | _____         | _____ | _____            |
| i) Exceptions to standard maintenance agreements | _____         | _____ | _____            |
| j) Product performance objectives                | _____         | _____ | _____            |
| k) Quality control in manufacturing              | _____         | _____ | _____            |
| l) OEM acceptance criteria                       | _____         | _____ | _____            |
| m) Customer education                            | _____         | _____ | _____            |

2. Please indicate the level that small system software support has been or will be integrated into the hardware support structure. (0% = no field service responsibility, 100% = fully integrated responsibility.)

| SOFTWARE SUPPORT ACTIVITY   | PERCENT INTEGRATED |         |         |         |
|---|--------------------|---------|---------|---------|
|   | 1982               | 1983    | 1985    | 1987    |
| a) System control programs at headquarters support level  | _____ %            | _____ % | _____ % | _____ % |
| b) System control programs in the field   | _____              | _____   | _____   | _____   |
| c) Compilers and system utilities at headquarters   | _____              | _____   | _____   | _____   |
| d) Compilers and system utilities in the field  | _____              | _____   | _____   | _____   |
| e) Applications software developed, sold, or distributed by your company - headquarters support | _____              | _____   | _____   | _____   |
| f) Applications (as in "e" above) in the field  | _____              | _____   | _____   | _____   |
| g) Maintenance of third-party software, including user's, at headquarters level                 | _____              | _____   | _____   | _____   |
| h) Maintenance of third-party software in the field   | _____              | _____   | _____   | _____   |

3. Please describe your field support or support center structure as it relates to:

a) User support requirements when users are involved via remote diagnostics.

b) User support requirements when users are assisted through preliminary stages of problem determination.

3. (Continued)

c) Support of on-site field personnel via telephone and/or remote diagnostics.

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d) Physical, on-site support to field personnel (please discuss criteria):

|  |
|--|
|  |
|  |
|  |
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|  |

4. Please provide the objectives and actuals in product performance for the most active small systems serviced by your organization.

| MODEL NUMBER OR<br>NAME OF MAINFRAMES | MEAN TIME<br>TO REPAIR<br>(hours) |       | MEAN TIME<br>BETWEEN<br>FAILURES<br>(hours) |       | AVERAGE<br>AVAILABILITY<br>(percent) |       | MEAN TIME<br>TO RESPOND<br>(hours) |       |
|---------------------------------------|-----------------------------------|-------|---|-------|--------------------------------------|-------|------------------------------------|-------|
|                                       | OBJ.                              | ACT.  | OBJ.  | ACT.  | OBJ.                                 | ACT.  | OBJ.                               | ACT.  |
| a) _____<br>_____                     | _____                             | _____ | _____                                       | _____ | _____                                | _____ | _____                              | _____ |
| b) _____<br>_____                     | _____                             | _____ | _____                                       | _____ | _____                                | _____ | _____                              | _____ |
| c) _____<br>_____                     | _____                             | _____ | _____                                       | _____ | _____                                | _____ | _____                              | _____ |
| d) _____<br>_____                     | _____                             | _____ | _____                                       | _____ | _____                                | _____ | _____                              | _____ |
| e) _____<br>_____                     | _____                             | _____ | _____                                       | _____ | _____                                | _____ | _____                              | _____ |



5. Please check the following items that apply in your field support organization (even if applicable to only one product currently serviced in the field). If not presently implemented, please indicate year scheduled.

|   | CURRENTLY<br>IMPLEMENTED?<br>YES/NO | YEAR<br>SCHEDULED |
|---|-------------------------------------|-------------------|
| a) Remote diagnostics   |                                     |                   |
| b) Centralized dispatching                                      |                                     |                   |
| c) Modular, plug-in units for user to deliver to repair centers |                                     |                   |
| d) Real-time incident reporting                                 |                                     |                   |
| e) Real-time IR (parts usage included)                          |                                     |                   |
| f) Signature analysis (field)                                   |                                     |                   |
| g) Regional repair centers                                      |                                     |                   |
| h) Third-party repair centers                                   |                                     |                   |
| i) Third-party on-site maintenance                              |                                     |                   |
| j) User support centers   |                                     |                   |

6. a) What has been the trend in your capital investment in small system spare parts inventories for the years indicated below? Please respond by percentage of gross service revenues derived from support of small systems.

| YEAR OF<br>MEASUREMENT       | PERCENT OF GROSS<br>SERVICE REVENUES<br>FOR YEAR |
|------------------------------|--|
| 1981                         | %  |
| 1982                         | %  |
| 1983 (most recent inventory) | %  |
| 1984 (projected)             | %  |
| 1985 (projected)             | %  |

b) To what most significant factors do you contribute the changes, i.e., growth of installed base, regional spares depots, regional repair centers, reliability of new products, etc.?

Comment: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

7. a) Have you announced or have you set a policy on the maintenance and support of local area networks serving competitive products? Yes/No \_\_\_\_\_

b) If yes, please comment on your position.

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c) If no, do you have any general comment on the subject of local area networks without making a policy statement?

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## C. Financial/Administrative Operations

1. How do you measure changes in field service productivity when measuring the effectiveness of changes in operating methods or investment in capital improvements?

| MEASUREMENT METHOD:  | YES/NO |
|--|--------|
| a) Ratio of gross revenue carried per field service person per month | _____  |
| b) Ratio of personnel to equipment by category of equipment          | _____  |
| c) Ratio of personnel to management                                  | _____  |
| d) Net ratio of expenses to revenue after cost of improvement        | _____  |
| e) Other _____   | _____  |
| _____  | _____  |
| _____  | _____  |

2. What levels of productivity have you realized in servicing small systems for the following? (Please classify measurement using a-e in question 1 above.)

| IMPROVEMENT                       | MEASUREMENT METHOD<br>(a-e) | PRODUCTIVITY IMPROVEMENT<br>(percent) |
|-----------------------------------|-----------------------------|---------------------------------------|
| a) Remote diagnostics             | _____                       | _____                                 |
| b) Repair centers                 | _____                       | _____                                 |
| c) Regional parts depots          | _____                       | _____                                 |
| d) Centralized dispatch           | _____                       | _____                                 |
| e) Support centers                | _____                       | _____                                 |
| f) Field education                | _____                       | _____                                 |
| g) Cross training                 | _____                       | _____                                 |
| h) Multiple territory assignments | _____                       | _____                                 |
| i) Other _____                    | _____                       | _____                                 |
| _____                             | _____                       | _____                                 |
| _____                             | _____                       | _____                                 |

3. Please indicate the percentage of total operating revenues credited to the field service division coming from the following categories. (If fiscal is different from calendar, please supply FY dates.)

| SOURCE OF REVENUE CREDITS                 | PERCENT OF TOTAL REVENUE |         |         |
|---|--------------------------|---------|---------|
|   | 1982                     | 1983    | 1984    |
| a) Equipment warranty credits             | _____ %                  | _____ % | _____ % |
| b) Basic period contracts for maintenance | _____                    | _____   | _____   |
| c) Extra shift premium                    | _____                    | _____   | _____   |
| d) Time and material (labor)              | _____                    | _____   | _____   |
| e) Time and material (parts)              | _____                    | _____   | _____   |
| f) Third-party contracts                  | _____                    | _____   | _____   |
| g) Installation charges                   | _____                    | _____   | _____   |
| h) De-installation charges                | _____                    | _____   | _____   |
| i) Technical consulting                   | _____                    | _____   | _____   |
| j) Management consulting                  | _____                    | _____   | _____   |
| k) Parts repairs                          | _____                    | _____   | _____   |
| l) Parts sales                            | _____                    | _____   | _____   |
| m) Supplies sales                         | _____                    | _____   | _____   |
| n) Sales of ancillary equipment           | _____                    | _____   | _____   |
| o) Maintenance of ancillary equipment     | _____                    | _____   | _____   |
| p) Sales of software products             | _____                    | _____   | _____   |
| q) Maintenance of software products       | _____                    | _____   | _____   |
| r) Revenues from other divisions          | _____                    | _____   | _____   |
| s) Other _____                            | _____                    | _____   | _____   |
| t) Other _____                            | _____                    | _____   | _____   |
| u) Other _____                            | _____                    | _____   | _____   |

4. Please indicate the percentage of total field service division expenses in the following categories (and supply FY dates if different from calendar year).

| EXPENSE LINE ITEM   | PERCENT OF TOTAL EXPENSES<br>[use ( ) to indicate credit] |       |       |
|---|---|-------|-------|
|   | 1982  | 1983  | 1984  |
| a) Basic direct labor, wages, salaries                            | _____   | _____ | _____ |
| b) Direct labor overtime shift premiums and standby pay           | _____   | _____ | _____ |
| c) Support personnel salaries                                     | _____   | _____ | _____ |
| d) Management and administrative salaries and premiums            | _____   | _____ | _____ |
| e) Benefits programs  | _____   | _____ | _____ |
| f) Net parts usage  | _____   | _____ | _____ |
| g) Inventory variances  | _____   | _____ | _____ |
| h) Depreciation   | _____   | _____ | _____ |
| i) Travel (includes auto leases)                                  | _____   | _____ | _____ |
| j) Relocation   | _____   | _____ | _____ |
| k) Education  | _____   | _____ | _____ |
| l) Equipment rental/lease   | _____   | _____ | _____ |
| m) Office, warehouse space  | _____   | _____ | _____ |
| n) Communications   | _____   | _____ | _____ |
| o) Interdivisional transfers                                      | _____   | _____ | _____ |
| p) Logistics, repair depot, and other expenses not reported above | _____   | _____ | _____ |
| q) Corporate general and administrative allocation (overhead)     | _____   | _____ | _____ |
| r) Other significant categories                                   | _____   | _____ | _____ |
| _____   | _____   | _____ | _____ |
| _____   | _____   | _____ | _____ |

5. Please check any of the following interdivisional transfers of revenues and expenses between your field service division and other departments, and indicate whether they are treated as revenue or expense items by checking the appropriate columns. (Check all columns that apply.)

| INTERDIVISIONAL TRANSFERS<br>OF ITEMS                  | REVENUE (FE)  |              | EXPENSE (FE)  |              |
|--|---------------|--------------|---------------|--------------|
|  | CREDIT<br>(✓) | DEBIT<br>(✓) | CREDIT<br>(✓) | DEBIT<br>(✓) |
| a) Warranty of equipment                               | _____         | _____        | _____         | _____        |
| b) Spare parts used during warranty                    | _____         | _____        | _____         | _____        |
| c) Direct labor during warranty                        | _____         | _____        | _____         | _____        |
| d) Sales assistance                                    | _____         | _____        | _____         | _____        |
| e) Maintenance sales commissions                       | _____         | _____        | _____         | _____        |
| f) Manufacturing assistance                            | _____         | _____        | _____         | _____        |
| g) Engineering assistance                              | _____         | _____        | _____         | _____        |
| h) Extended warranties                                 | _____         | _____        | _____         | _____        |
| i) Nonstandard contract terms, e.g., on-site engineers | _____         | _____        | _____         | _____        |
| j) Defective spare parts                               | _____         | _____        | _____         | _____        |
| k) Sales changes to equipment                          | _____         | _____        | _____         | _____        |
| l) Safety changes                                      | _____         | _____        | _____         | _____        |
| m) Engineering changes                                 | _____         | _____        | _____         | _____        |
| n) Other _____   | _____         | _____        | _____         | _____        |
| _____  | _____         | _____        | _____         | _____        |
| _____  | _____         | _____        | _____         | _____        |

6. Please supply the figures as indicated for your overall financial performance (indicate fiscal year if different from calendar year).

| FINANCIAL PERFORMANCE   | FISCAL YEAR END _____ |       |       |       |
|---|-----------------------|-------|-------|-------|
|   | 1982                  | 1983  | 1984  | 1987  |
| a) Field service revenue (\$ millions)  | _____                 | _____ | _____ | _____ |
| b) Field service expenses (\$ millions)   | _____                 | _____ | _____ | _____ |
| c) Pretax profit (percent)  | _____                 | _____ | _____ | _____ |
| d) Revenue per field service engineer (direct labor)                                | _____                 | _____ | _____ | _____ |
| e) Direct expense per field service engineer (direct labor)                         | _____                 | _____ | _____ | _____ |
| f) Fully burdened expense per field service engineer (direct labor)                 | _____                 | _____ | _____ | _____ |
| g) Basic hourly rate charged for service  | _____                 | _____ | _____ | _____ |
| h) Fully burdened field service expense per field service employee (all categories) | _____                 | _____ | _____ | _____ |

7. Please comment below on service to remote customers: zone charges, response times, etc.

a) Zone definitions:

Primary zone 0 — \_\_\_\_\_ miles

Zone 2 \_\_\_\_\_ — \_\_\_\_\_ miles

Zone 3 \_\_\_\_\_ — \_\_\_\_\_ miles

Other criteria: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b) Zone premiums added to basic maintenance charges: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

c) Response time targets for zones: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

d) Other comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



8. a) Please describe the methodology your company uses to set small system maintenance prices (percent of purchase tested against cost of service projection, etc.):

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- b) At what ratio of basic maintenance price to list price do you believe that:

|   |         |
|---|---------|
| i) Small system users will actively consider alternative sources                      | _____ % |
| ii) Small system users will definitely contract third party or maintain own equipment | _____ % |
| iii) Users will refuse to buy the original product, given the option                  | _____ % |

- c) How frequently have you and do you expect to change prices of maintenance for:

|                         | FREQUENCY OF CHANGE (months) |       |       |       |
|-------------------------|------------------------------|-------|-------|-------|
|                         | 1982                         | 1983  | 1984  | 1985  |
| i) Small systems        | _____                        | _____ | _____ | _____ |
| ii) Basic hourly rates  | _____                        | _____ | _____ | _____ |
| iii) Shift differential | _____                        | _____ | _____ | _____ |

- d) Do you offer discounts for:

|   | PERCENT DISCOUNT |
|---|------------------|
| i) User assistance in remote diagnostics                        | _____ %          |
| ii) User replacement of plug-in modules or units                | _____ %          |
| iii) User delivery of plug-in modules or units to repair center | _____ %          |
| iv) Relaxed requirement on response time                        | _____ %          |
| v) User purchase of spare parts kits                            | _____ %          |
| vi) Other: _____  | _____ %          |

## 9. Contract administration:

- a) Are your maintenance contracts: (i) automatically renewed \_\_\_\_\_ or (ii) negotiated each renewal cycle? \_\_\_\_\_
- b) What is the length of your normal contract? \_\_\_\_\_ (months)
- c) Do you normally invoice (i) monthly \_\_\_\_\_, (ii) quarterly \_\_\_\_\_, (iii) semiannually \_\_\_\_\_, (iv) annually \_\_\_\_\_, (v) other \_\_\_\_\_.
- d) Do you invoice for exceptions (time and material, etc.) at a different time than your normal cycle?  
Yes/No \_\_\_\_\_ If yes, please describe:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- e) Who is responsible for maintenance contract:  
i) Negotiation \_\_\_\_\_  
ii) Renewal \_\_\_\_\_  
iii) Administration \_\_\_\_\_

10. a) Has your field service division implemented a field quality assurance program or other formal operational audit? Yes/No \_\_\_\_\_

- b) If yes, please describe: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. What is the average cost breakdown of a typical fault call? (Please respond for products your company services.)

| PRODUCT SERVICED              | TOTAL<br>COST<br>(dollars) | DIRECT<br>LABOR<br>(percent) | TRAVEL<br>(percent) | PARTS<br>(percent) | OVERHEAD<br>& SUPPORT |
|-------------------------------|----------------------------|------------------------------|---------------------|--------------------|-----------------------|
| Large mainframes              | _____                      | _____                        | _____               | _____              | _____                 |
| Medium mainframes             | _____                      | _____                        | _____               | _____              | _____                 |
| Small systems                 | _____                      | _____                        | _____               | _____              | _____                 |
| Peripherals                   | _____                      | _____                        | _____               | _____              | _____                 |
| Terminals                     | _____                      | _____                        | _____               | _____              | _____                 |
| Word processors               | _____                      | _____                        | _____               | _____              | _____                 |
| Personal computers            | _____                      | _____                        | _____               | _____              | _____                 |
| Copiers, facsimile            | _____                      | _____                        | _____               | _____              | _____                 |
| Work stations                 | _____                      | _____                        | _____               | _____              | _____                 |
| PABX, PBX                     | _____                      | _____                        | _____               | _____              | _____                 |
| Teleprocessing/communications | _____                      | _____                        | _____               | _____              | _____                 |

D. Personnel

1. Please identify your sources of new employees and rate them on a scale of 1-10. (1 = little or no importance, 10 = highest importance.)

| SOURCE OF NEW EMPLOYEES      | RATING (1-10) |      |      |      |
|------------------------------|---------------|------|------|------|
|                              | 1982          | 1983 | 1984 | 1987 |
| a) Competition               |               |      |      |      |
| b) Trade schools             |               |      |      |      |
| c) Military schools          |               |      |      |      |
| d) Two-year college programs |               |      |      |      |
| e) Four-year colleges        |               |      |      |      |
| f) Apprenticeship programs   |               |      |      |      |
| g) Other division in company |               |      |      |      |
| h) Employee referrals        |               |      |      |      |
| i) Headquarters              |               |      |      |      |
| j) Other: _____              |               |      |      |      |

2. Do you provide in-company formal training for:

|                                      | YES/NO |
|--------------------------------------|--------|
| a) Indoctrination                    |        |
| b) Basic training (apprentice level) |        |
| c) Product (technical)               |        |
| d) Systems software (system)         |        |
| e) Applications software             |        |
| f) Management development            |        |
| g) Technological upgrading           |        |

3. Do you fully (F) or partially (P) reimburse or otherwise provide financial support for:

|   | F/P   |
|---|-------|
| a) University courses   | _____ |
| b) Out-company seminars in management development   | _____ |
| c) Professional association membership  | _____ |
| d) Purchase of company stock  | _____ |
| e) Professional trade journals  | _____ |
| f) Matching grants to educational institutions  | _____ |
| g) Children's higher education  | _____ |
| h) Out-company training in professional (technical) development                                 | _____ |
| i) Nonexempt employee relocation  | _____ |
| j) New-hire relocation  | _____ |
| k) Exempt employee relocation   | _____ |
| l) Lease or purchase of automobiles to be used for business                                     | _____ |
| m) Lease or purchase of company products (micros, minis, personal computers, typewriters, etc.) | _____ |
| n) Other: _____   | _____ |
| _____   | _____ |
| _____   | _____ |

4. Do your personnel policies and procedures provide for the following employee benefits and assurances? (Y/N)

| FRINGE BENEFITS                                 | EXEMPT |         | NONEXEMPT |         |
|---|--------|---------|-----------|---------|
|   | 1983   | BY 1985 | 1983      | BY 1985 |
| a) Life insurance                               | _____  | _____   | _____     | _____   |
| b) Hospitalization                              | _____  | _____   | _____     | _____   |
| c) Major medical (80% or better)                | _____  | _____   | _____     | _____   |
| d) Limited medical (out patient)                | _____  | _____   | _____     | _____   |
| e) Dental                                       | _____  | _____   | _____     | _____   |
| f) Eyesight/glasses                             | _____  | _____   | _____     | _____   |
| g) Retirement                                   | _____  | _____   | _____     | _____   |
| h) Disability insurance                         | _____  | _____   | _____     | _____   |
| i) Matched savings                              | _____  | _____   | _____     | _____   |
| j) Profit-sharing                               | _____  | _____   | _____     | _____   |
| k) Paid sick leave                              | _____  | _____   | _____     | _____   |
| l) Grievance procedures                         | _____  | _____   | _____     | _____   |
| m) Improvement programs for marginal performers | _____  | _____   | _____     | _____   |
| n) Exit interviews                              | _____  | _____   | _____     | _____   |
| o) Appraisal and counseling                     | _____  | _____   | _____     | _____   |
| p) Career path definitions                      | _____  | _____   | _____     | _____   |
| q) Pay for performance guidelines               | _____  | _____   | _____     | _____   |

5. Does your company provide incentives for field service employees? (Indicate by check mark.)

| INCENTIVES   | MANAGEMENT |         | EXEMPT |         | NONEXEMPT |         |
|--|------------|---------|--------|---------|-----------|---------|
|  | 1983       | BY 1985 | 1983   | BY 1985 | 1983      | BY 1985 |
| a) Stock options   | _____      | _____   | _____  | _____   | _____     | _____   |
| b) Performance bonuses                                     | _____      | _____   | _____  | _____   | _____     | _____   |
| c) Suggestion awards                                       | _____      | _____   | _____  | _____   | _____     | _____   |
| d) Periodic recognition awards ("FE of the quarter," etc.) | _____      | _____   | _____  | _____   | _____     | _____   |
| e) Special projects, foreign assignments, etc.             | _____      | _____   | _____  | _____   | _____     | _____   |
| f) Award conferences, trips                                | _____      | _____   | _____  | _____   | _____     | _____   |
| g) Competitive scholarships for employees or family        | _____      | _____   | _____  | _____   | _____     | _____   |
| h) Other: _____  | _____      | _____   | _____  | _____   | _____     | _____   |
| _____  | _____      | _____   | _____  | _____   | _____     | _____   |
| _____  | _____      | _____   | _____  | _____   | _____     | _____   |

6. a) How many direct labor field service personnel were hired in the following years?

1982 \_\_\_\_\_

1983 \_\_\_\_\_ (forecast)

1984 \_\_\_\_\_ (forecast)

b) How many direct-labor field service personnel left your company in:

1982 \_\_\_\_\_

1983 \_\_\_\_\_ (forecast)

c) What percentage of the persons leaving leave for the following reasons:

|  | 1982       | 1983       |
|--|------------|------------|
| i) Voluntary, no reason given                            | _____ %    | _____ %    |
| ii) Left for higher salary, better total compensation    | _____      | _____      |
| iii) Released for company reasons                        | _____      | _____      |
| iv) Promotion in another company                         | _____      | _____      |
| v) Relocation by another company                         | _____      | _____      |
| vi) Promoted within own company                          | _____      | _____      |
| vii) Transferred to foreign subsidiary or other division | _____      | _____      |
| viii) Other _____  | _____      | _____      |
| Total  | _____ 100% | _____ 100% |

d) Staffing levels:

| U.S. EMPLOYEES  | 1983  | 1984  |
|---|-------|-------|
| i) Total employees in company                                   | _____ | _____ |
| ii) Total in field service division                             | _____ | _____ |
| iii) Number of direct-labor FEs                                 | _____ | _____ |
| iv) Number of field support engineers                           | _____ | _____ |
| v) Number of field supervisors                                  | _____ | _____ |
| vi) Number of managers in field                                 | _____ | _____ |
| vii) Line managers at headquarters                              | _____ | _____ |
| viii) FE staff managers (total)                                 | _____ | _____ |
| ix) FE staff personnel (nonmanagement including administration) | _____ | _____ |



7. 1983 annual salaries, small system field engineers (front-line product field service technicians)

| JOB DESCRIPTION  | TITLE | (✓)<br>EXEMPT | NUMBER<br>IN<br>U.S. | RANGE   |         | AVERAGE<br>PAID<br>(actual) | AVERAGE<br>GAIN<br>OVER 1982<br>(percent) |
|--|-------|---------------|----------------------|---------|---------|-----------------------------|---|
|  |       |               |                      | MAXIMUM | MINIMUM |                             |   |
| a) Entry-level trainee for hardware maintenance  |       | ( )           |                      |         |         |                             | %   |
| b) Entry-level trainee in software maintenance   |       | ( )           |                      |         |         |                             | %   |
| c) Minimum experience level qualified to respond to trouble calls, generally requires assistance   |       | ( )           |                      |         |         |                             | %   |
| d) Qualified field service technician carries territory, requires occasional assistance, renders some aid to lower levels  |       | ( )           |                      |         |         |                             | %   |
| e) Senior-level field service technician: generally gives more assistance than received, assigned field training duties to assist in development of first two categories (above) |       | ( )           |                      |         |         |                             | %   |
| f) Qualified field service engineer in software support  |       | ( )           |                      |         |         |                             | %   |
| g) Senior level software support in field  |       |               |                      |         |         |                             |   |
| h) Top-level hardware specialist located in field office   |       | ( )           |                      |         |         |                             | %   |
| i) Top-level software specialist located in field office   |       | ( )           |                      |         |         |                             | %   |

8. 1983 annual salaries, field office staff personnel

| JOB DESCRIPTION  | TITLE | (✓)<br>EXEMPT | NUMBER<br>IN<br>U.S. | RANGE   |         | AVERAGE<br>PAID<br>(actual) | AVERAGE<br>GAIN<br>OVER 1982<br>(percent) |
|--|-------|---------------|----------------------|---------|---------|-----------------------------|---|
|  |       |               |                      | MINIMUM | MAXIMUM |                             |   |
| a) Repair depot, repair technician trainee   |       | ( )           |                      |         |         |                             | %   |
| b) Repair depot, repair technician   |       | ( )           |                      |         |         |                             | %   |
| c) Senior-level repair depot technician  |       | ( )           |                      |         |         |                             | %   |
| d) Office administrator, Jr.   |       | ( )           |                      |         |         |                             | %   |
| e) Office administrator, Sr.   |       | ( )           |                      |         |         |                             | %   |
| f) Field service supervisor may work approximately 50/50 on equipment and management |       | ( )           |                      |         |         |                             | %   |
| g) First-line manager of field service engineers                                     |       | ( )           |                      |         |         |                             | %   |
| h) Second-line manager located in field offices                                      |       | ( )           |                      |         |         |                             | %   |
| i) Staff manager in education and field support                                      |       | ( )           |                      |         |         |                             | %   |
| j) Staff manager in operations and financial analysis                                |       | ( )           |                      |         |         |                             | %   |
| k) Field service administration manager  |       | ( )           |                      |         |         |                             | %   |
| l) Field service personnel manager   |       | ( )           |                      |         |         |                             | %   |









